



Universal drilling and milling machines with linear guideways



F1410 LF



F1410 LF high speed



CC-F1410 LF



CC-F1410 LF high speed

**Walter Blombach GmbH
Tool and Machine Factory**

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EC – Conformity Declaration

In the name of the manufacturer

Walter Blombach GmbH

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we hereby declare that the universal milling and drilling machines specified below

Universal milling and drilling machine type:

F1410 LF

F1410 LF high speed

CC-F1410 LF

CC-F1410 LF high speed

meet the following regulation requirements for standard serial production:

- **directive for machines 98/37 EG**
- **low voltage directive 73/23/EWG**
- **EMV directive 89/336/EWG**

In order to meet / implement the requirements of the above mentioned directives, the following applicable and previously published standards have been adhered to:

EN ISO 12100-1

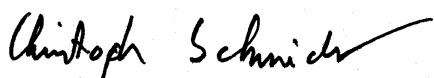
EN ISO 12100-2

EN 12840

EN 60204-1

D-54673 Neuerburg

City



Signature

Dear customer!

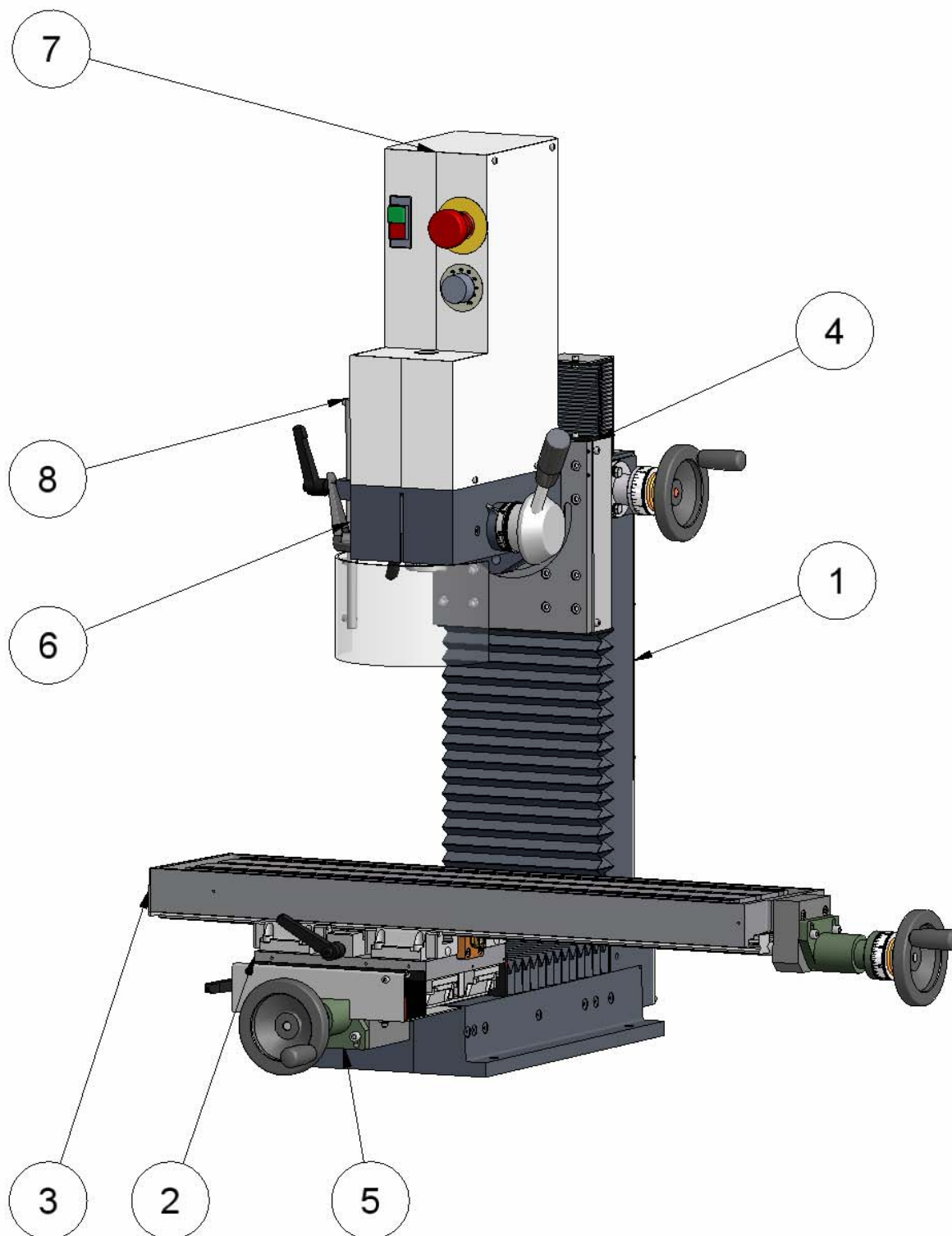
Congratulations on choosing the **WABECO Universal Drilling and Milling Machine**. We have devoted great care in its manufacture and it has passed a thorough quality control test. These operating instructions are to help you to work with it safely and properly. Therefore we request that you read the respective instructions carefully and follow them exactly.

After unpacking the machine please check to see if any kind of damage has occurred during transportation. Any complaints must be lodged immediately. Complaints made at a later date **cannot** be accepted.

If you have any questions or need any spare parts, please state the machine number located on the front of the motor (see rating plate).

1 Product range

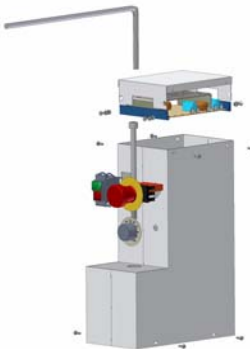
1.1 F1410 LF with trapezoid thread spindle



1 Product range

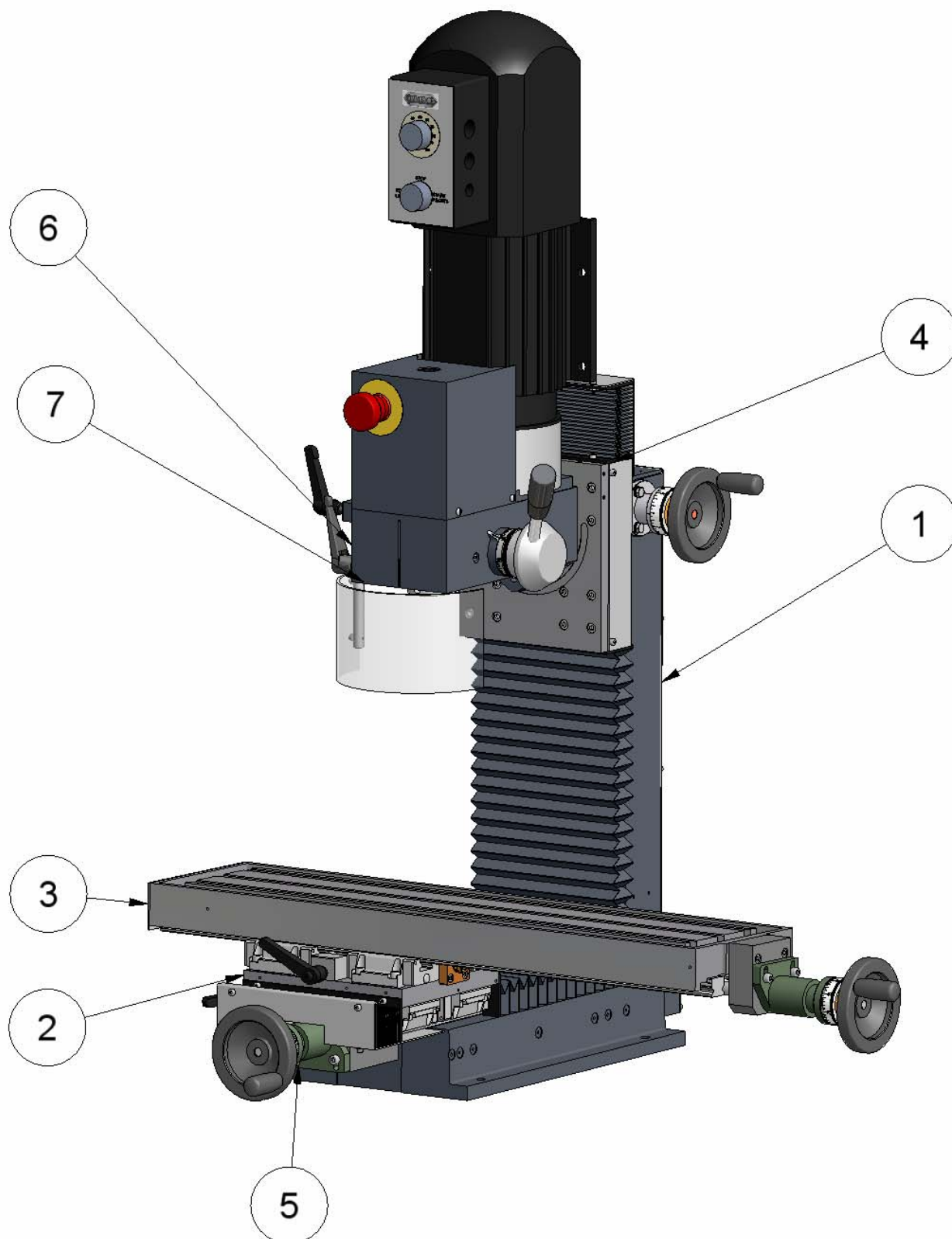
1.1 F1410 LF with trapezoid thread spindle

1) Base machine see 3.7 page 34	2) Cross slide see 3.16 page 50	3) Top slide see 3.13 page 46	4) Vertical slide see 3.10 page 40
			

5) Y-spindle see 3.19 page 53	6) Protective cover see 3.3 page 26	7) Protective cover with electrical equipment see 3.1 page 22	8) Milling head siehe 3.4 Seite 28
			

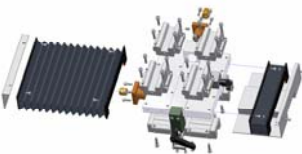
1 Product range

1.2 F1410 LF high speed **with trapezoid thread spindle**



1 Product range

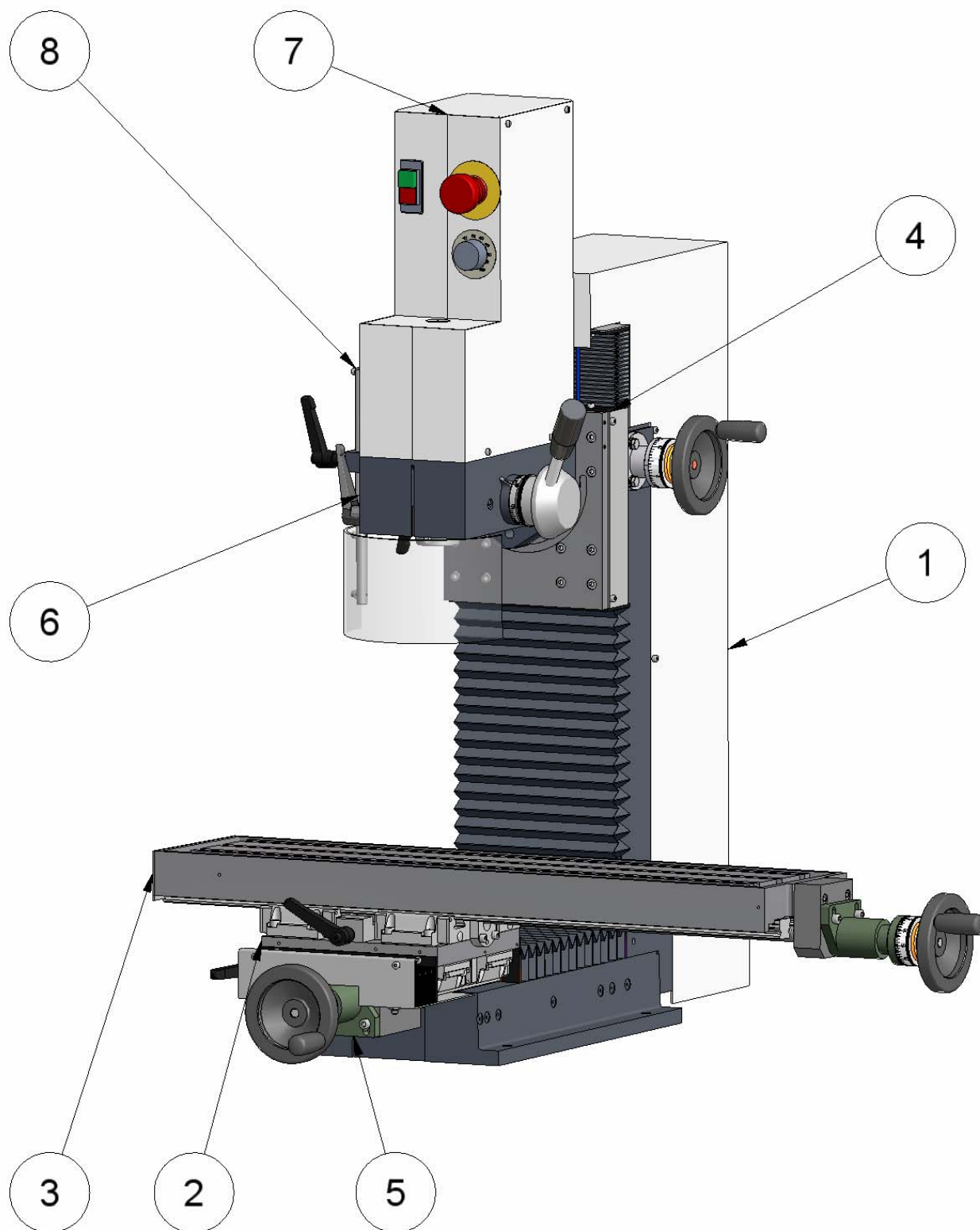
1.2 F1410 LF high speed **with trapezoid thread spindle**

1) Base machine see 3.7 page 34	2) Cross slide see 3.16 page 50	3) Top slide see 3.13 page 46	4) Vertical slide see 3.10 page 40
			

5) Y-spindle see 3.19 page 53	6) Milling head see 3.5 page 30	7) Protective cover see 3.3 page 26
		

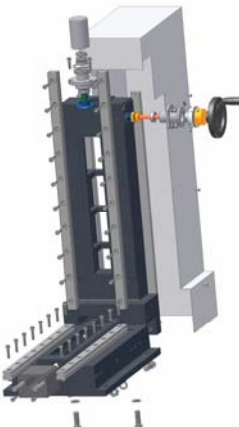
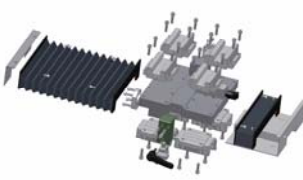
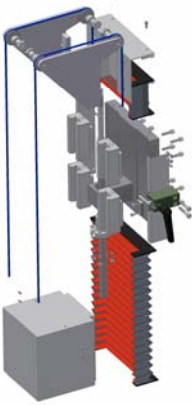
1 Product range

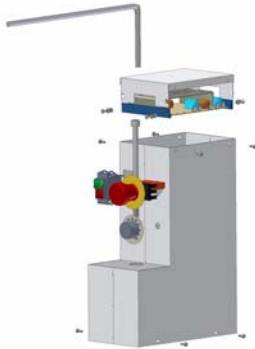
1.3 F1410 LF **with ball bearing spindle**



1 Product range

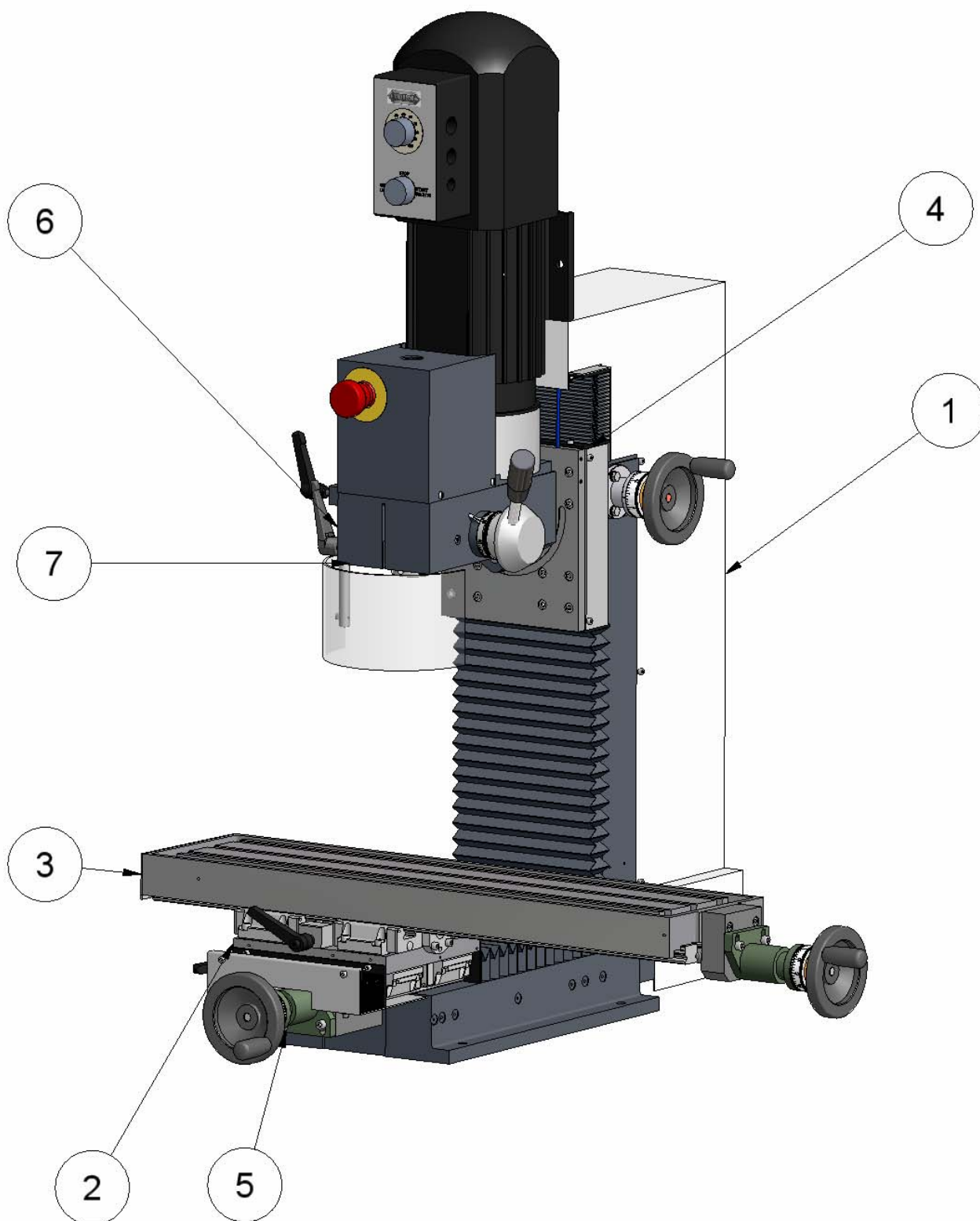
1.3 F1410 LF with ball bearing spindle

1) Base machine see 3.8 page 36	2) Cross slide see 3.17 page 51	3) Top slide see 3.14 page 47	4) Vertical slide see 3.11 page 42
			

5) Y-spindle see 3.20 page 54	6) Protective cover see 3.3 page 26	7) Protective cover with electrical equipment see 3.1 page 22	8) Milling head see 3.4 page 28
			

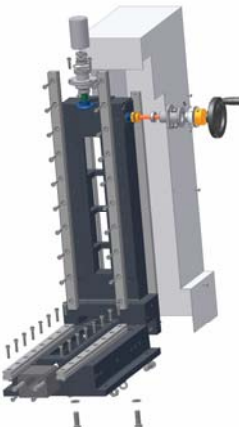
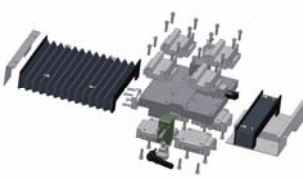
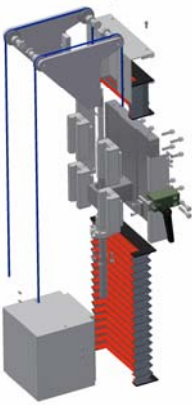
1 Product range

1.4 F1410 LF high speed **with ball bearing spindle**



1 Product range

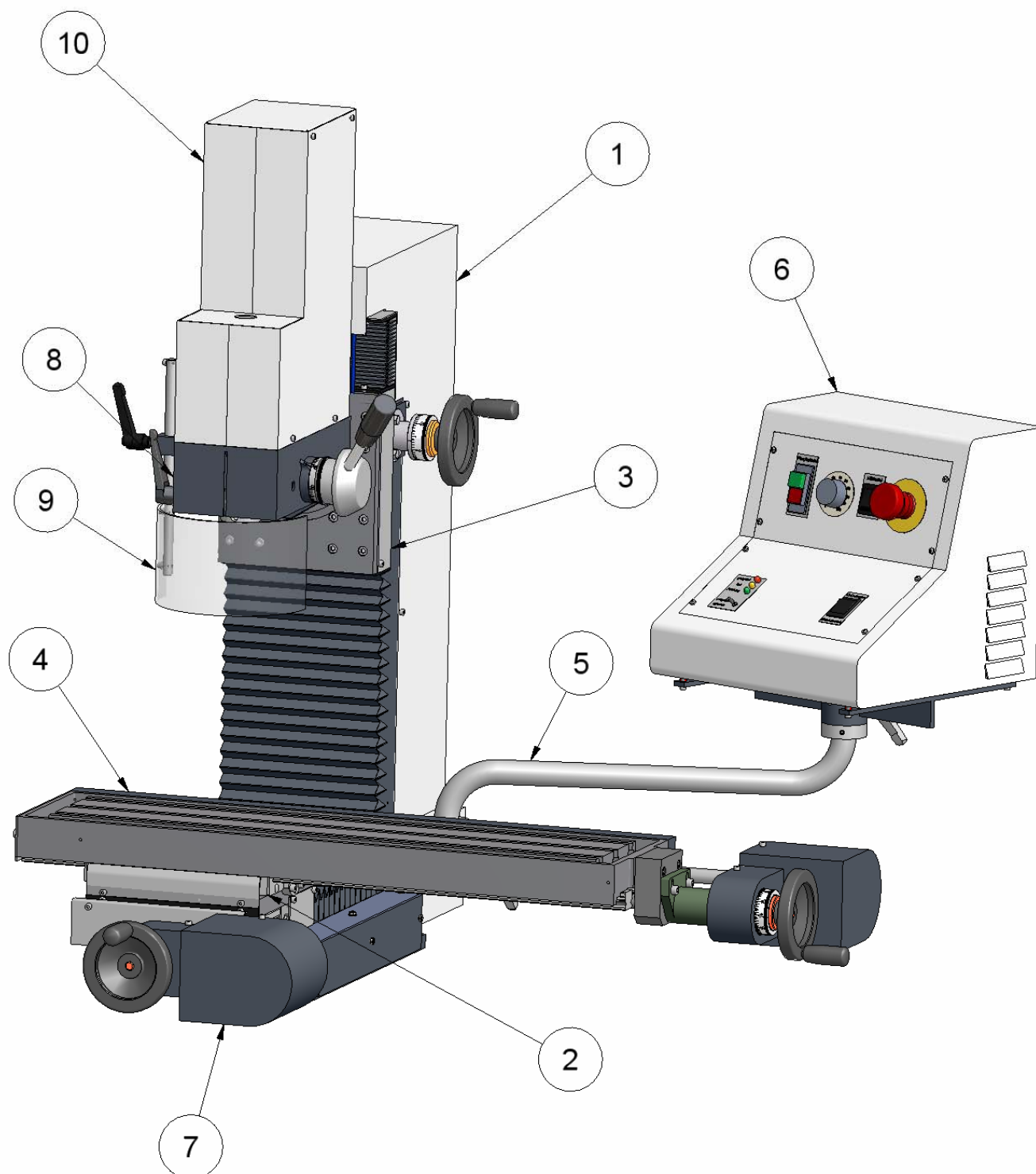
1.4 F1410 LF high speed **with ball bearing spindle**

1) Base machine see 3.8 page 36	2) Cross slide see 3.17 page 51	3) Top slide see 3.14 page 47	4) Vertical slide see 3.11 page 42
			

5) Y-spindle see 3.20 page 54	6) Milling head see 3.5 page 30	7) Protective cover see 3.3 page 26
		

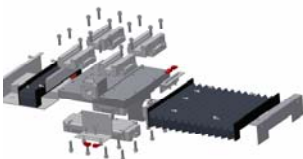
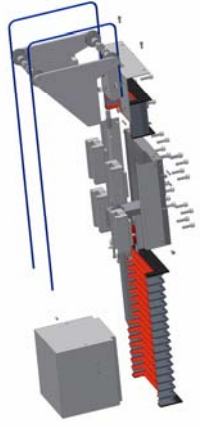
1 Product range

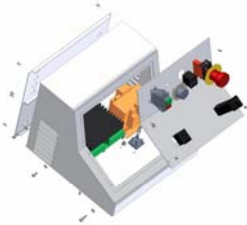
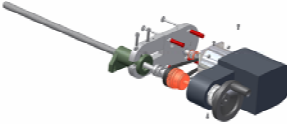
1.5 CC-F1410 LF



1 Product range

1.5 CC-F1410 LF

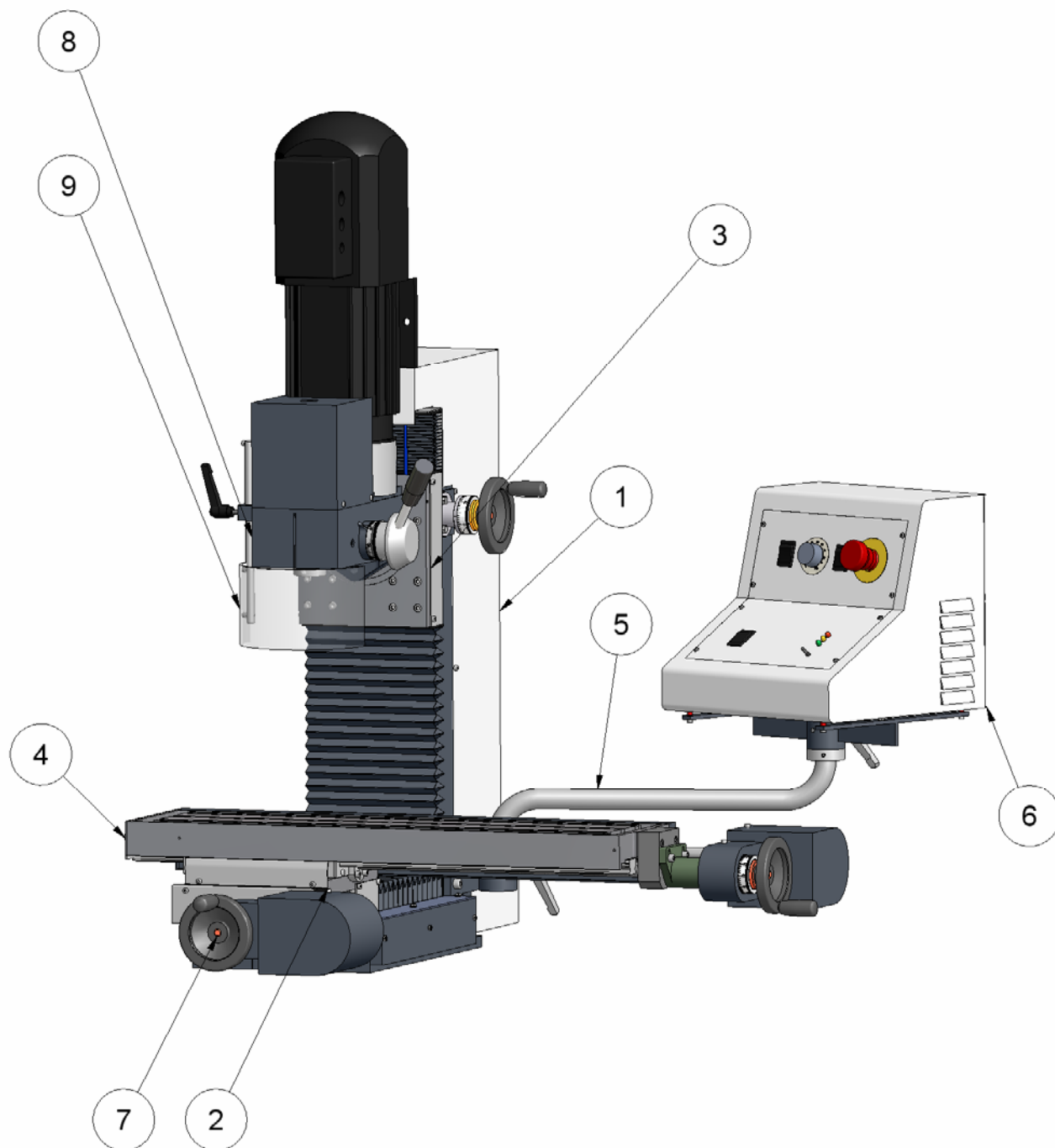
1) Base machine see 3.9 page 38	2) Cross slide see 3.18 page 52	3) Vertical slide see 3.12 page 44	4) Top slide see 3.15 page 48
			

5) Arm for control mechanism see 3.22 page 56	6) Control station see 3.23,3.25 page 58	7) Y-spindle see 3.21 page 55	8) Milling head see 3.4 page 28
			

9) Protective cover see 3.3 page 26	10) Protective cover with electrical equipment see 3.2 page 24
	

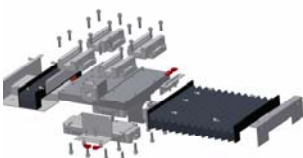
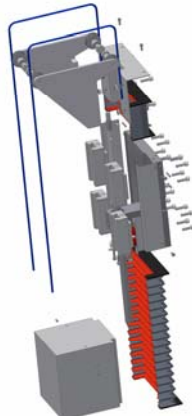
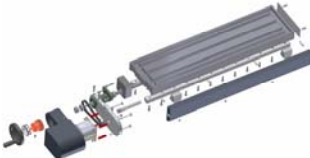
1 Product range

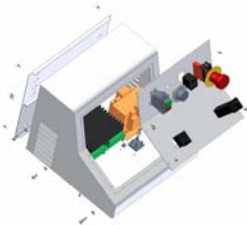
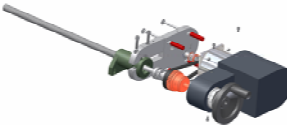
1.6 CC-F1410 LF **high speed**



1 Product range

1.6 CC-F1410 LF **high speed**

1) Base machine see 3.9 page 8	2) Cross slide see 3.18 page 52	3) Vertical slide see 3.12 page 44	4) Top slide see 3.15 page 48
			

5) Arm for control mechanism see 3.22 page 56	6) Control station see 3.24,3.26 page 58	7) Y-spindle see 3.21 page 55	8) Milling head see 3.6 page 32
			

9) Protective cover see 3.3 page 26


Dimensions of the milling and drilling machine

installation area (trapezoid thread).....	width 1415 mm x depth 705 mm
installation area (ball bearing spindle).....	width 1415 mm x depth 875 mm
height 1,4 kW.....	950 mm
height 2,0 kW	1100 mm

Working area

Longitudinal travel X-axis	500 mm
Transverse travel Y-axis	200 mm
Vertical travel Z-axis	280 mm

Work table – cross table

length x width	700 x 180 mm
number of T-slots.....	3

Milling head

swivelling range	90° both sides
tool holder	MT2 optional MT3 or SK30
tool clamping	In-house innovation for clamping and ejecting tools
drilling stroke	55 mm

Distance milling table work spindle

min.	65 mm
max.	350 mm
working range spindle nose –support.....	185 mm

Electrical equipment (for F1410 LF)

drive	single-phase inverse-speed motor as direct current model infinitely variable with continuous r.p.m. surveillance
nominal voltage, frequency	230V, 50 Hz
consumption	6A
service output	1,4 kW
tool spindle.....	140-3000 r.p.m.

Electrical equipment (for F1410 LF high speed)

drive	motor with frequency converter infinitely variable with continuous r.p.m. surveillance and clockwise and anticlockwise rotation
nominal voltage, frequency	230V, 50 Hz
consumption	8,6 A
service output	2,0 kW
tool spindle.....	100-7500 r.p.m

Feed motors (hybrid-step motors)

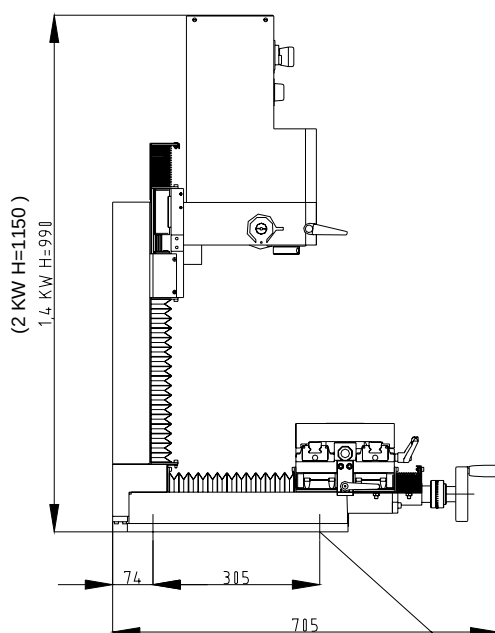
voltage	2,9 V _{DC}
current	1,7 A
torque resistance.....	1 Nm
number of steps per rev.	200
angle of step.....	1,8°

- Technical details are subject to change -

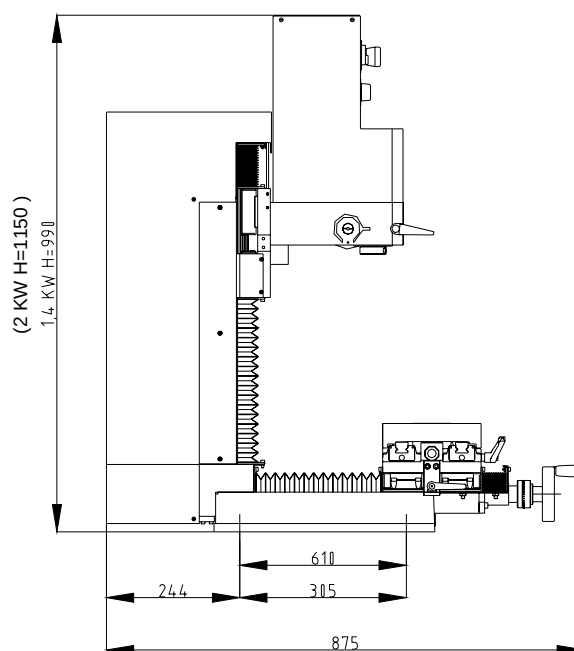
2 Technical Data

2.1 Dimensions

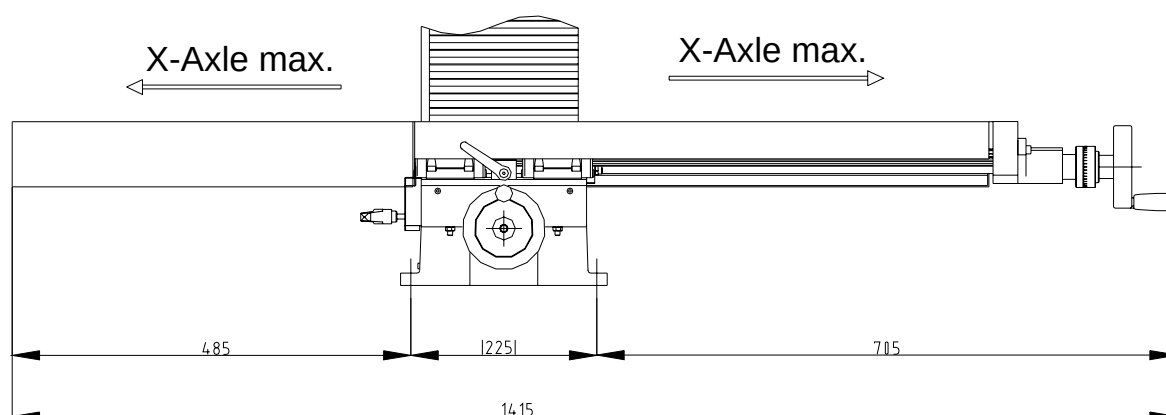
Trapezoid thread spindle



Ball bearing spindle

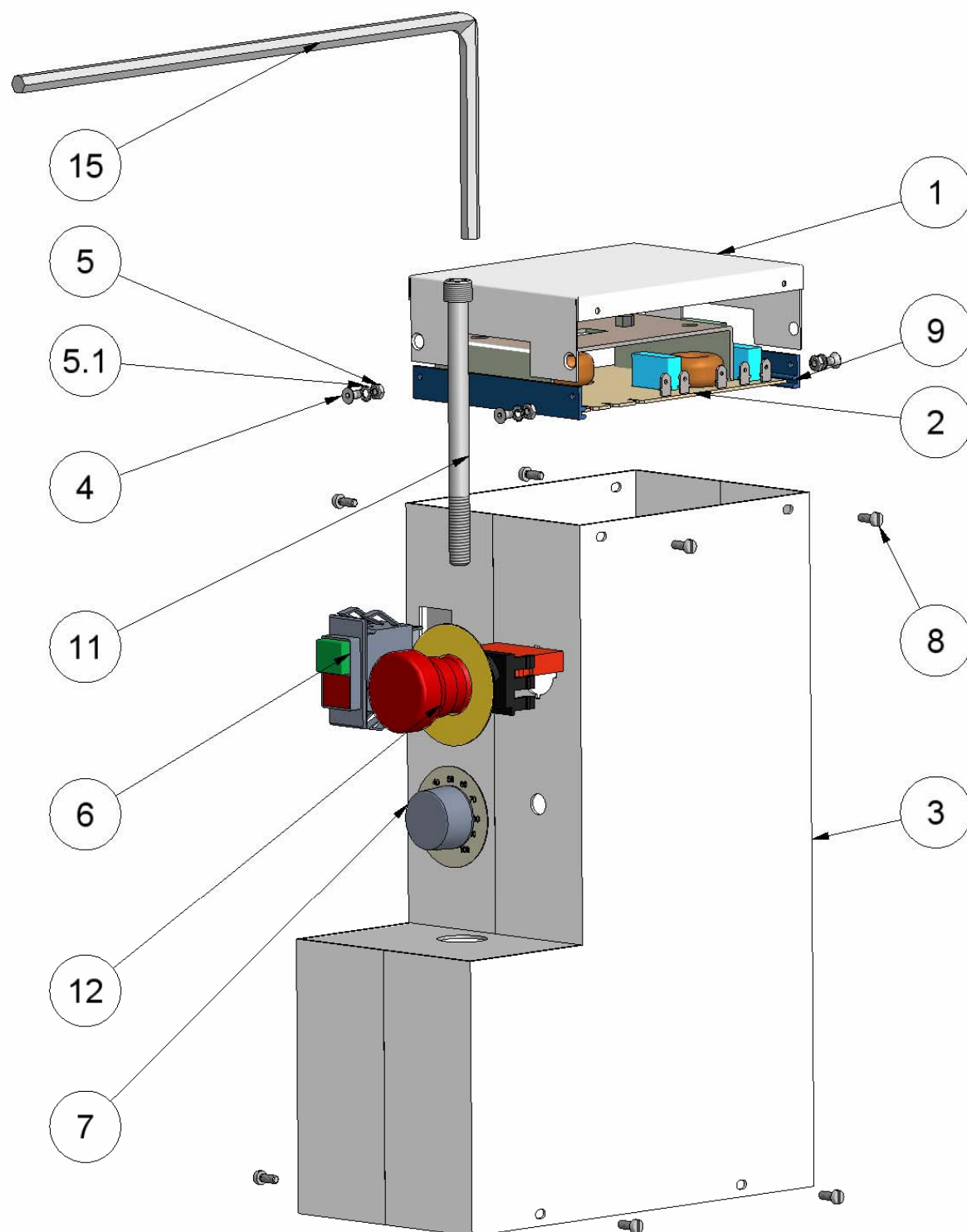


Fixing hole in the bottom plate
4x Ø10 distance 305x225



3 Drawing and list of parts

3.1 Protective cover with electrical equipment for F1410 LF



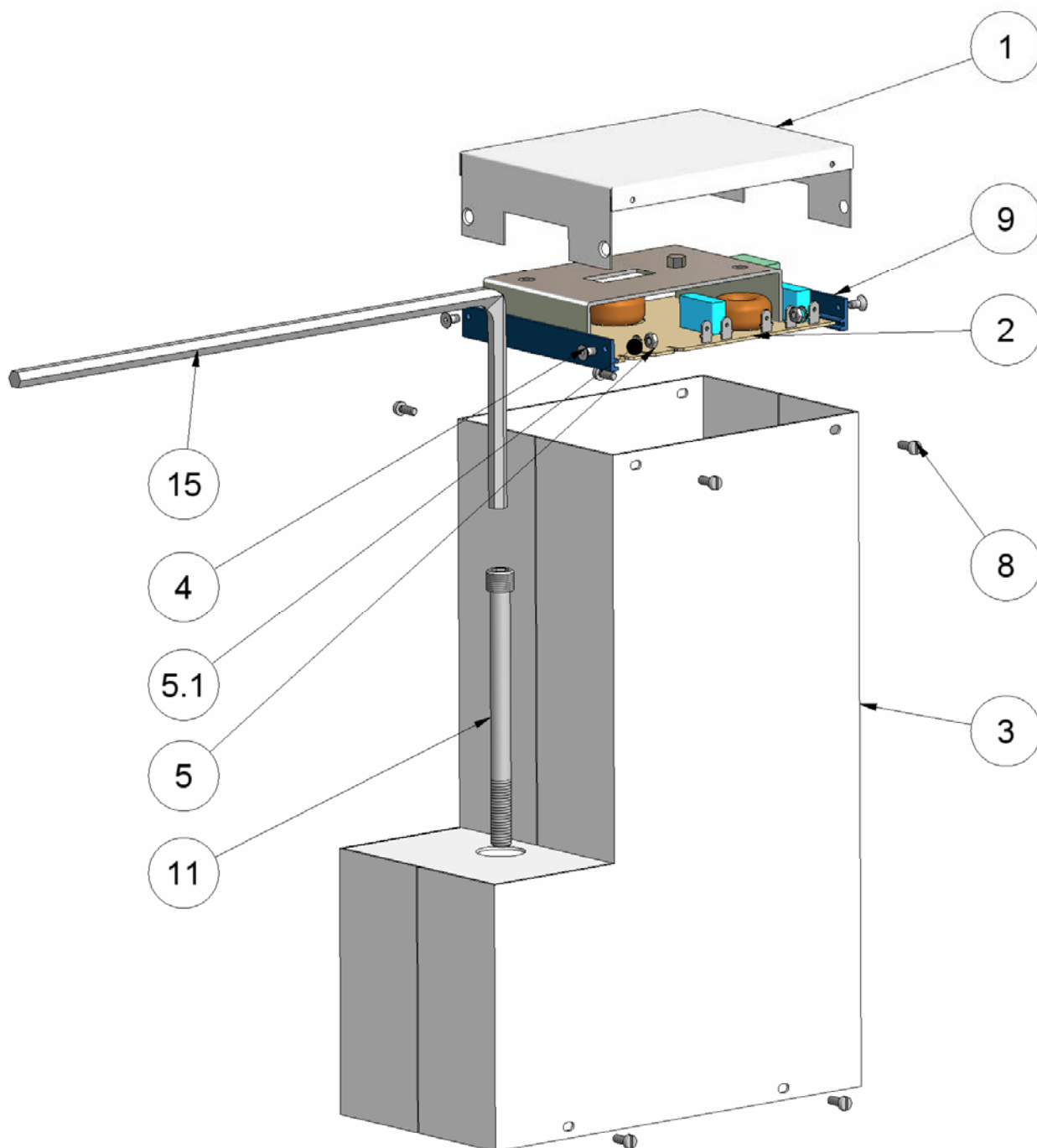
3 Drawing and list of parts

3.1.1 List of parts protective cover with electrical equipment for F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11200401	Cap
2	1	11800005	Circuit board
3	1	11200403	Cover
4	4	11700001	Countersunk screw
5	4	11700002	Hexagonal nut
5.1	4	11700120	Locking washer
6	1	11800001	ON/OFF switch
7	1	11800004	Potentiometer
8	8	11700003	Tapping screw
9	2	11200405	Tin-plate board rest
11	1	11200411	Tool draw-in bolt with thread M10 for MT2
11.1	1	112004111	Tool draw-in bolt with thread M12 for MT3 and SK30
12	1	11800008	Emergency OFF switch (german)
15	1	11200415	Hexagonal socket key 8 mm for MT2
15.1	1	112004151	Hexagonal socket key 10 mm for MT3 and SK30

3 Drawing and list of parts

3.2 Protective cover with electrical equipment for CC-F1410 LF



3 Drawing and list of parts

3.2.1 List of parts protective cover with electrical equipment for CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11200401	Cap
2	1	11800005	Circuit board
3	1	112004031	Cover
4	4	11700001	Countersunk screw
5	4	11700002	Hexagonal nut
5.1	4	11700120	Locking washer
8	8	11700003	Tapping screw
9	2	11200405	Tin-plate board rest
11	1	11200411	Tool draw-in bolt with thread M10 <i>for MT2</i>
11.1	1	112004111	Tool draw-in bolt with thread M12 <i>for MT3 and SK30</i>
15	1	11200415	Hexagonal socket key 8 mm <i>for MT2</i>
15.1	1	112004151	Hexagonal socket key 10 mm <i>for MT3 and SK30</i>

3 Drawing and list of parts

Protective cover for F1410 LF, F1410 LF high speed, CC-F1410 LF and
CC-F1410 LF high speed



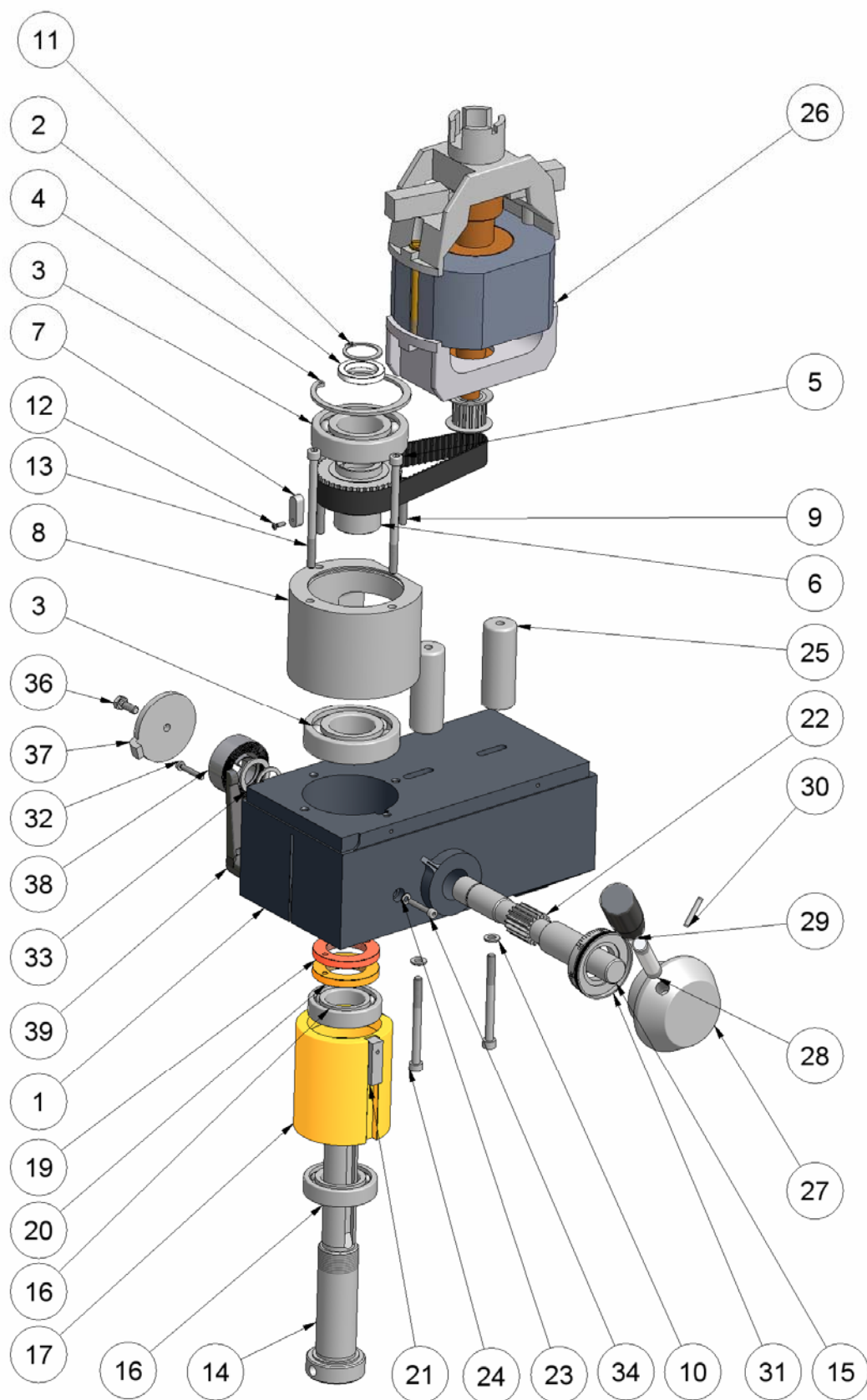
List of parts for protective cover

for F1410 LF, F1410 LF high speed, CC-F1410 LF and CC-F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11270101	Protective cover
2	1	11270102	Tool holder
2.1	1	11840004	Clamping lever
3	1	11270103	Guide rod
3.1	3	11700026	Screw
3.2	2	11700038	Washer

3 Drawing and list of parts

3.4 Milling head **with 1,4 kW motor** for F1410 LF and CC-F1410 LF



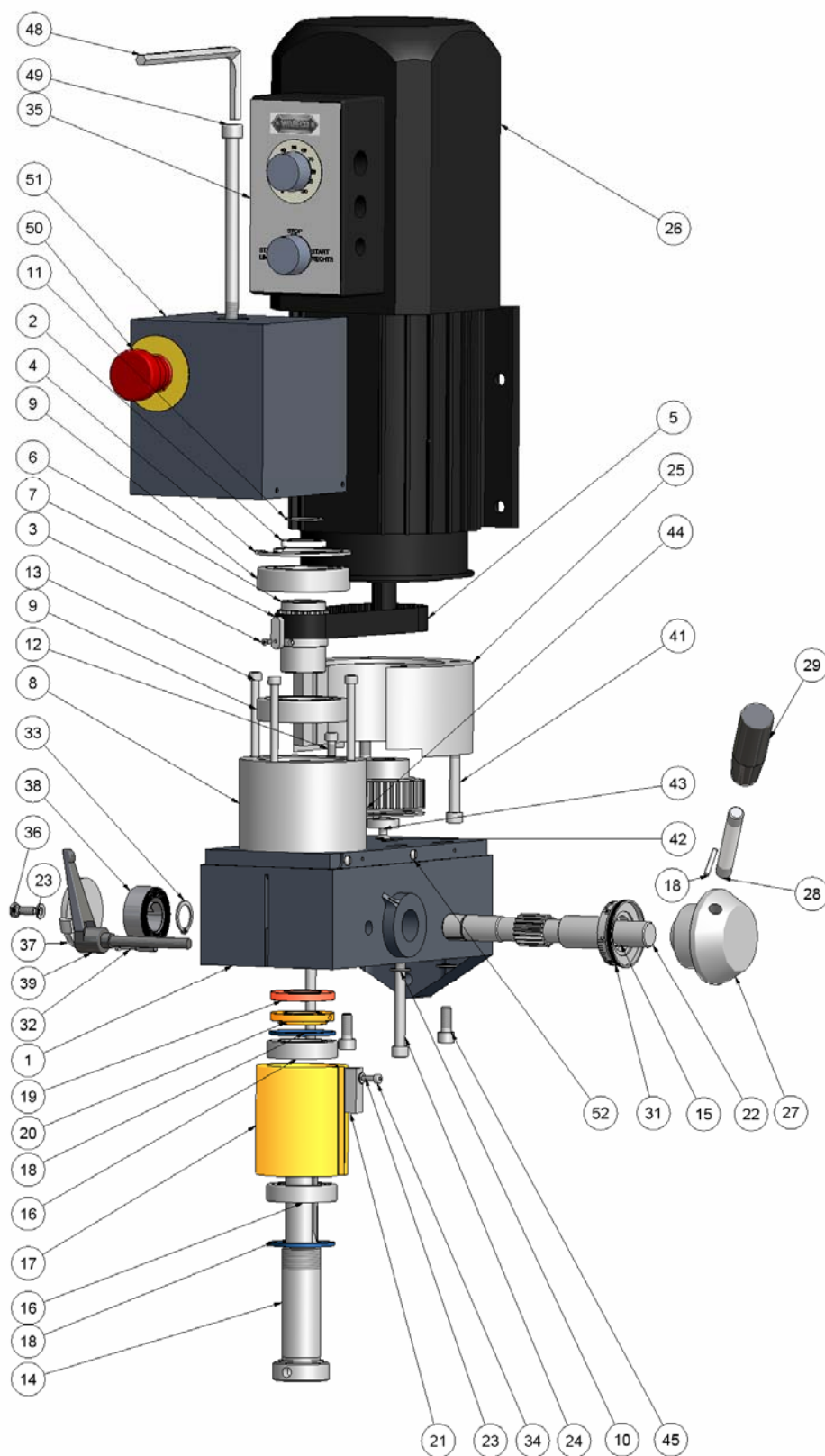
3 Drawing and list of parts

3.4.1 List of parts for milling head **with 1,4 kW motor** for F1410 LF and CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11200101	Housing
2	1	11200102	Plastic ring
3	2	11810001	Ball bearing
4	1	11700005	Circlip
5	1	11820001	Drive belt
6	1	11200106	Belt pulley
7	1	11700006	Feather key
8	1	11200108	Bearing flange
9	1	11700046	Hexagonal socket srew
10	2	11830001	Limpet washer
11	1	11700027	Circlip
12	1	11700011	Screw
13	3	11700123	Hexagonal socket screws
14	1	11200114	Tool spindle MT2
14	1	112001141	Tool spindle MT3
14	1	112001142	Tool spindle SK30
15	1	11200115	Feather
16	2	11810002	Ball bearing
17	1	11200117	Quill
19	1	11200119	Nut
20	1	11200120	Nut
21	1	11200121	Feather key
22	1	11200122	Pinion
23	1	11700018	Limpet washer
24	2	11700010	Hexagonal socket srew
25	2	11200125	Spacer sleeve
26	1	11200126	Motor with pinion Z12
27	1	11200127	(Wheel) hub
28	1	11200128	Activating lever
29	1	11840001	Handle
30	1	11700016	Spiral clamp pin
31	1	11200131	Graduated collar
32	1	11700004	Cylinder head screw
33	1	11700012	Circlip
34	1	11700013	Hexagonal socket srew
36	1	11700015	Hexagonal screw
37	1	11200137	Depth stop
38	1	11850001	Spiral spring
39	1	11840002	Clamping lever

3 Drawing and list of parts

3.5 Milling head high speed **with 2,0 kW motor** for F1410 LF high speed



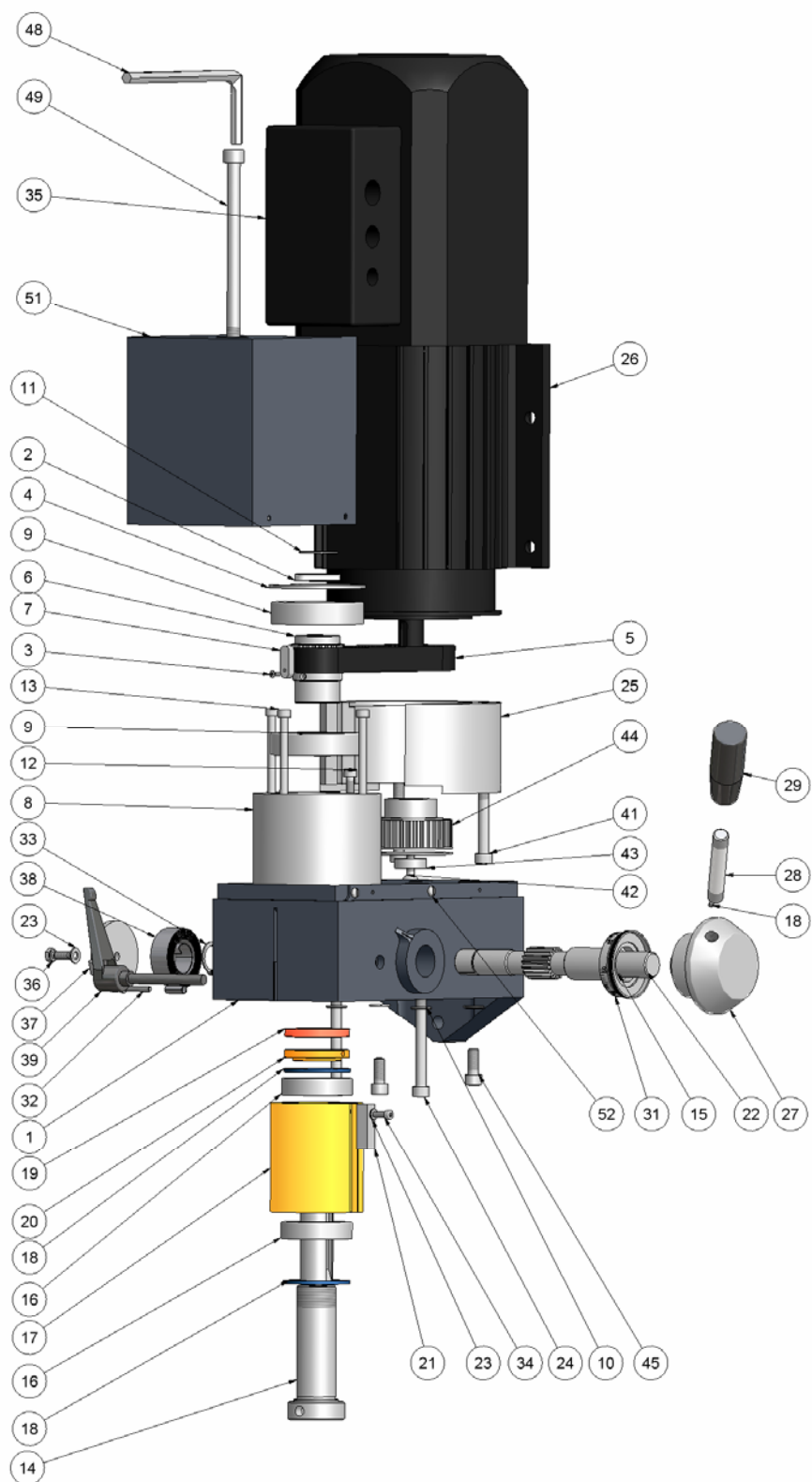
3 Drawing and list of parts

3.5.1 List of parts for milling head high speed **with 2,0 kW motor** for F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11202101	Housing
2	1	11200102	Plastic ring
3	1	11700011	Hexagonal socket screw
4	1	11700005	Circlip
5	1	11820010	Drive belt
6	1	11202106	Belt pulley
7	1	11700006	Feather key
8	1	11200108	Bearing flange
9	2	11810001	Ball bearing
10	6	11700060	Limpet washer
11	1	11700025	Circlip
12	1	11700046	Hexagonal socket screw
13	3	11700123	Hexagonal screws
14	1	11200114	Tool spindle MT2
14.1	1	112001141	Tool spindle MT3
14.2	1	112001142	Tool spindle SK30
15	1	11200115	Spring wire
16	2	11810021	Spirale bearing
17	1	11200117	Quill
18	2	11810022	Nilosring (special seal washer)
19	1	11200119	Counter nut thin
20	1	11200120	Tighten nut thick
21	1	11200121	Feather key
22	1	11200122	Pinion shaft
23	1	11700018	Limpet washer
24	2	11700123	Hexagonal socket screw
25	1	11202125	Flange
26	1	16400126	Motor high speed
27	1	11200127	(Wheel) hub
28	1	11200128	Activating lever
29	1	11840001	Handle
30	1	11700016	Spiral clamp pin
31	1	11200131	Graduated collar
32	1	11700124	Cylinder head screw
33	1	11700012	Circlip
34	1	11700121	Hexagonal socket screw
35	1	11202135	Control cover
36	1	11700092	Hexagonal screw
37	1	11200137	Depth stop
38	1	11850001	Spiral spring
39	1	11840002	Clamping lever
41	2	11700036	Hexagonal socket screw
42	1	11700051	Flat-headed screw
43	1	11202143	Thrust washer
44	1	11202144	Belt pulley motor
45	2	11700021	Hexagonal socket screw
48	1	11200415	Hexagon socket screw key 8 mm for MT2
48.1	1	112004151	Hexagon socket screw key 10 mm for MT3 and SK30
49	1	11200411	Tool draw-in bolt with thread M10 for MT2
49.1	1	112004111	Tool draw-in bolt with thread M12 for MT3 and SK30
50	1	11800008	Emergency OFF switch
51	1	11202151	Protective cover

3 Drawing and list of parts

3.6 Milling head high speed **with 2,0 kW motor** for CC-F1410 LF high speed



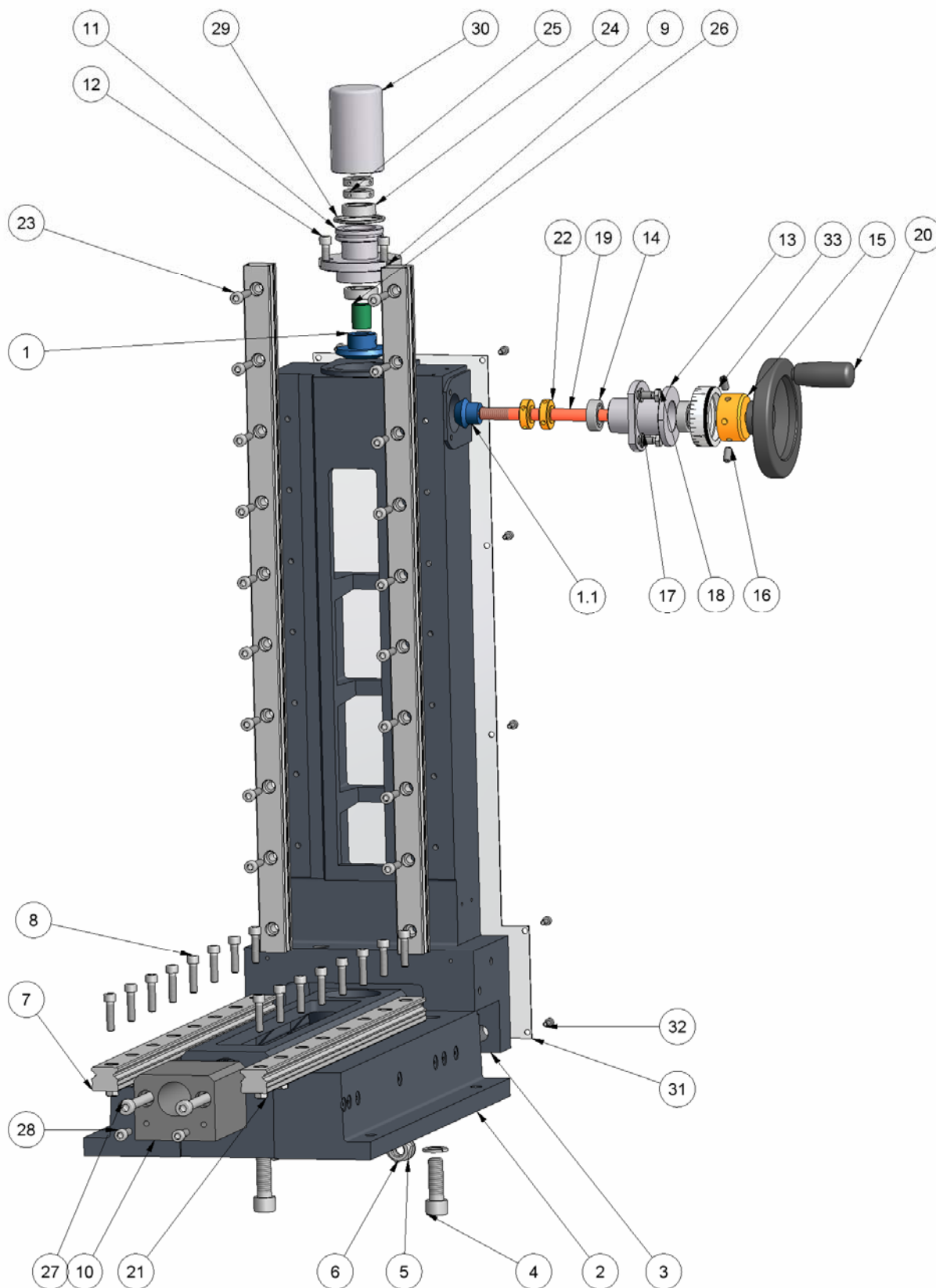
3 Drawing and list of parts

List of parts milling head high speed **with 2,0 kW motor** for CC-F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11202101	Housing
2	1	11200102	Plastic ring
3	1	11700011	Hexagonal socket screw
4	1	11700005	Circlip
5	1	11820010	Drive belt
6	1	11202106	Belt pulley
7	1	11700006	Feather key
8	1	11200108	Bearing flange
9	2	11810001	Ball bearing
10	6	11700060	Limpet washer
11	1	11700025	Circlip
12	1	11700046	Hexagonal socket screw
13	3	11700123	Hexagonal screws
14	1	11200114	Tool spindle MT2
14.1	1	112001141	Tool spindle MT3
14.2	1	112001142	Tool spindle SK30
15	1	11200115	Spring wire
16	2	11810021	Spirale bearing
17	1	11200117	Quill
18	2	11810022	Nilosring (special seal washer)
19	1	11200119	Nut
20	1	11200120	Nut
21	1	11200121	Feather key
22	1	11200122	Pinion shaft
23	1	11700018	Limpet washer
24	2	11700123	Hexagonal socket screw
25	1	11202125	Flange
26	1	16400126	Motor high speed
27	1	11200127	(Wheel) hub
28	1	11200128	Activating lever
29	1	11840001	Handle
30	1	11700016	Spiral clamp pin
31	1	11200131	Graduated collar
32	1	11700124	Cylinder head screw
33	1	11700012	Circlip
34	1	11700121	Hexagonal socket screw
35	1	112021351	Cap
36	1	11700092	Hexagonal screw
37	1	11200137	Depth stop
38	1	11850001	Spiral spring
39	1	11840002	Clamping lever
41	2	11700036	Hexagonal socket screw
42	1	11700051	Flat-headed screw
43	1	11202143	Thrust washer
44	1	11202144	Belt pulley motor
45	2	11700021	Hexagonal socket screw
48	1	11200415	Hexagon socket screw key 8 mm for MT2
48.1	1	112004151	Hexagon socket screw key 10 mm for MT3 and SK30
49	1	11200411	Tool draw-in bolt with thread M10 for MT2
49.1	1	112004111	Tool draw-in bolt with thread M12 for MT3 and SK30
51	1	112021511	Protective cover

3 Drawing and list of parts

3.7 Base machine F1410 LF with trapezoid thread spindle



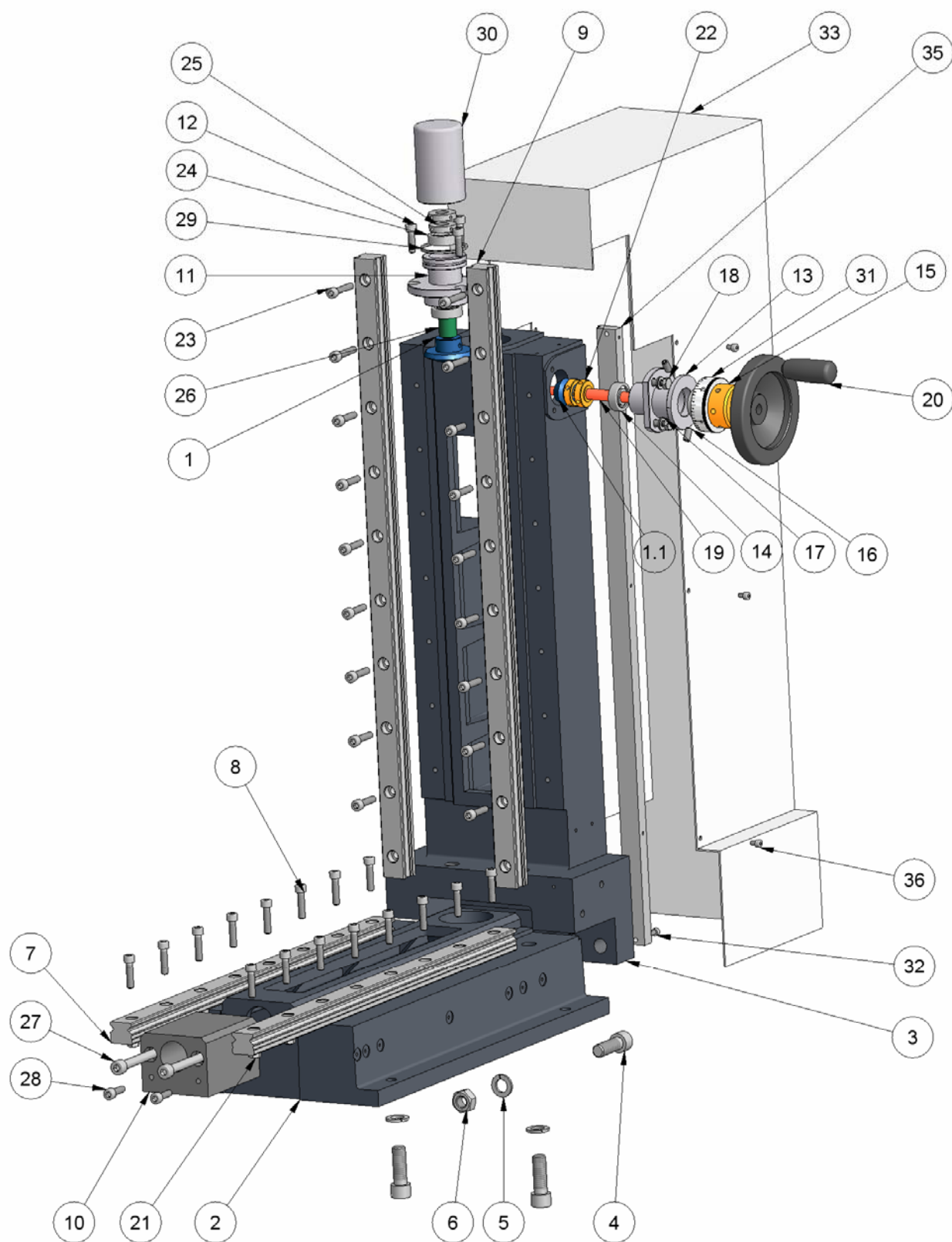
3 Drawing and list of parts

3.7.1 List of parts base machine F1410 LF **with trapezoid thread spindle**

Part-No.	Pieces	Order-No.	Designation
1	1	112003226	Bevel gear Z30
1.1	1	112003182	Bevel gear Z15
2	1	16400203	Base plate
3	1	16400301	Z-stand
4	4	11700033	Hexagon cylinder screw
5	4	11700034	Washer
6	2	11700035	Hexagon nut
7	2	11810023	Guidance ledge 460 mm
8	29	11700031	Hexagon cylinder screw
9	2	11810024	Guidance ledge 580 mm
10	1	16400224	Spindle extension Y-axis
11	1	164003224	Spindle flange Z-axis
12	3	11700031	Hexagon cylinder screw
13	1	164003186	Spindle flange Z-axis, cross
14	2	11810003	Ball bearing
15	1	1640031810	Adjusting ring
16	2	11700087	Locking screw
17	3	11700018	Limpet washer
18	3	11700015	Hexagonal screw
19	1	164003183	Spindel Z-axis, cross
20	1	11840005	Handwheel
21	4	11700019	Hexagon nut
22	2	164003184	Adjusting nut
23	4	11700046	Screw
24	2	11810007	Ball bearing
25	2	164002101	Adjusting nut
26	1	16400342	Sleeve
27	2	11700125	Screw
28	2	11700031	Screw
29	1	11810025	O-ring
30	1	16400222	End cap Z-axis
31	1	11200320	Protective cover
32	10	11700026	Hexagon cylinder screw
33	1	112003187	Graduated collar

3 Drawing and list of parts

3.8 Base machine F1410 LF **with ball bearing spindle**



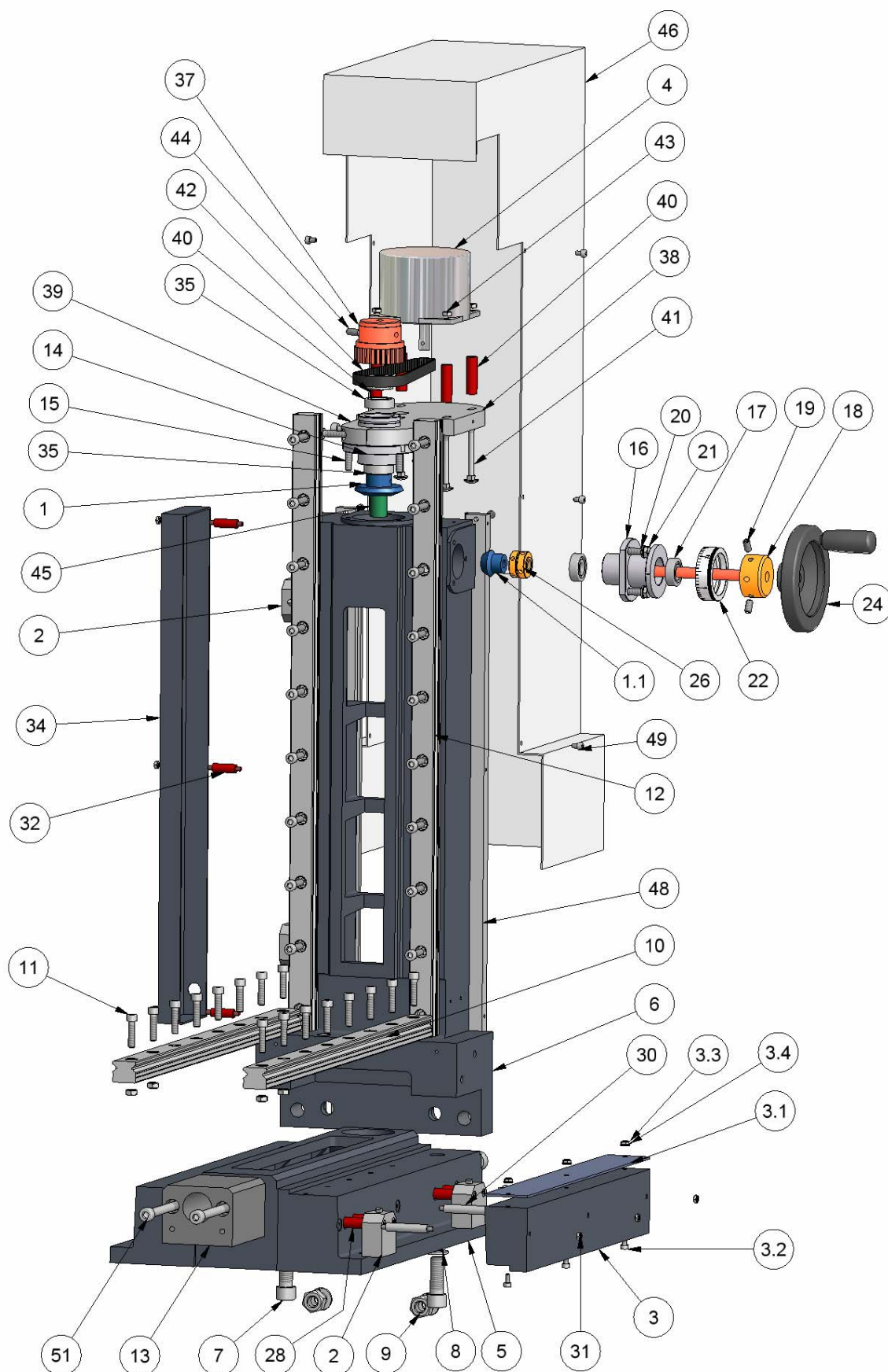
3 Drawing and list of parts

3.8.1 List of parts base machine F1410 LF **with ball bearing spindle**

Part-No.	Pieces	Order-No.	Designation
1	1	112003226	Bevel gear Z30
1.1	1	112003182	Bevel gear Z15
2	1	16400203	Base plate
3	1	16400301	Z-stand
4	4	11700033	Hexagon cylinder screw
5	4	11700034	Washer
6	2	11700035	Hexagon nut
7	2	11810023	Guidance ledge 460 mm
8	29	11700031	Hexagon cylinder screw
9	2	11810024	Guidance ledge 580 mm
10	1	16400224	Spindle extension Y-axis
11	1	164003224	Spindle flange Z-axis
12	3	11700031	Hexagon cylinder screw
13	1	164003186	Spindle flange Z-axis, cross
14	2	11810003	Ball bearing
15	1	1640031810	Adjusting ring
16	2	11700087	Locking screw
17	3	11700018	Limpet washer
18	3	11700015	Hexagonal screw
19	1	164003183	Spindel Z-axis, cross
20	1	11840005	Handwheel
21	4	11700019	Hexagon nut
22	2	164003184	Adjusting nut
23	4	11700046	Screw
24	2	11810007	Ball bearing
25	2	164002101	Adjusting nut
26	1	16400342	Sleeve
27	2	11700125	Screw
28	2	11700031	Screw
29	1	11810025	O-ring
30	1	16400222	End cap Z-axis
31	1	112453187	Graduated collar
32	4	11700026	Hexagon cylinder screw
33	1	16400347	Cover Z-axis
35	2	16400332	Guidance ledge counterbalance
36	6	11700026	Hexagon cylinder screw

3 Drawing and list of parts

3.9 Base machine CC-F1410 LF



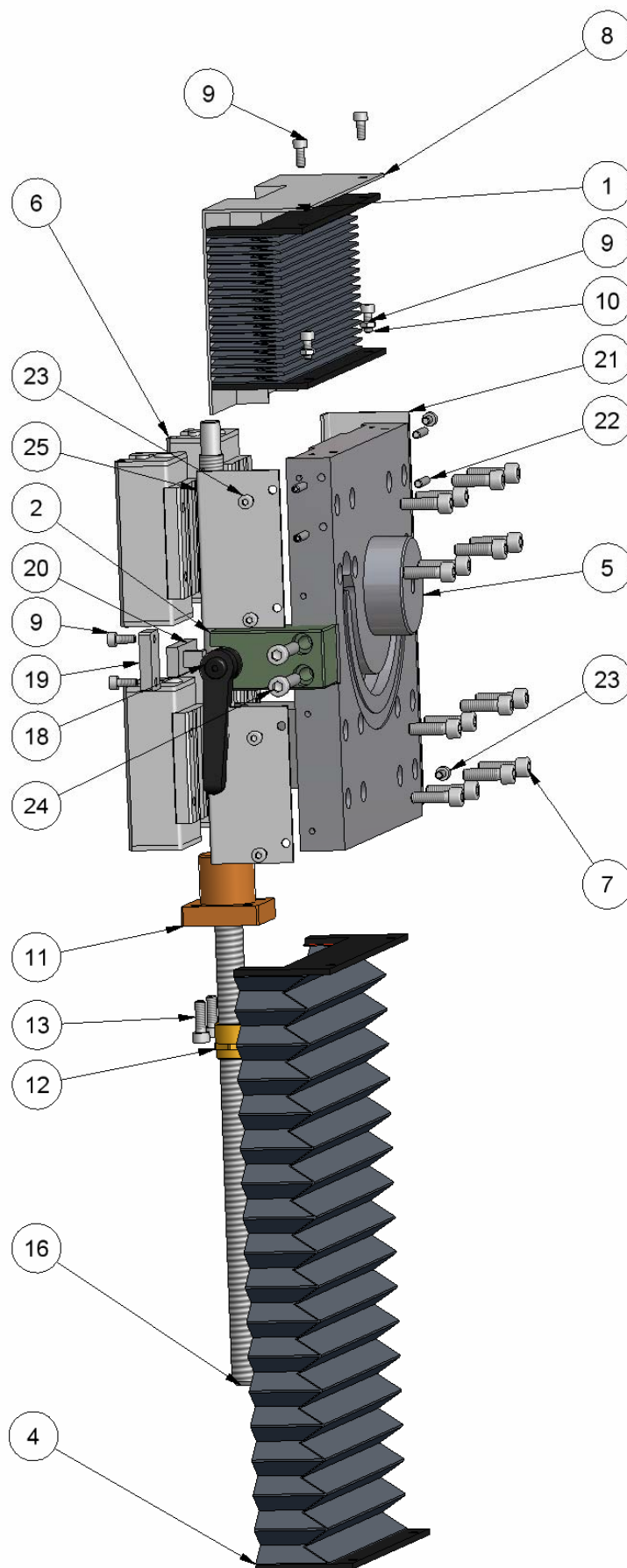
3 Drawing and list of parts

3.9.1 List of parts base machine CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	112003226	Bevel gear Z30
1.1	1	112003182	Bevel gear Z15
2	4	11900017	Limiting switch
3	1	16410204	Cover limiting switch Y-axis
3.1	1	16400206	Rubber plate
3.2	3	11700031	Hexagon cylinder screw
3.3	3	11700002	Hexagon nut
3.4	3	11700038	Limpet washer
4	1	11800003	Step motor
5	1	16400203	Base plate
6	1	16400301	Z-column
7	4	11700033	Hexagon cylinder screw
8	4	11700034	Spring lock washer
9	2	11700035	Hexagon nut
10	2	11810023	Guidance ledge 460 mm
11	30	11700031	Hexagon cylinder screw
12	2	11810024	Guidance ledge 580 mm
13	1	16400224	Spindle extension Y-axis
14	1	164003224	Spindle flange Z-axis
15	3	11700031	Hexagon cylinder screw
16	1	164003186	Spindle flange Z-axis, cross
17	2	11810003	Ball bearing
18	1	1640031810	Adjusting ring Z-axis
19	1	11700087	Headless pin
20	3	11700018	Limpet washer
21	3	11700031	Hexagon cylinder screw
22	1	112453187	Graduated collar
23	1	164003183	Hexagon cylinder screw
24	1	11840003	Handwheel
26	2	164003184	Adjusting nut
28	4	16400205	Limiting switch holder
30	3	16400211	Distance limiting switch
31	6	11700002	Hexagon nut
32	3	16400211	Distance limiting switch
34	1	16410205	Cover limiting switch Z-axis
35	2	11810007	Ball bearing
36	2	164002101	Adjusting nut
37	1	16400336	Belt pulley Z-axis
38	1	11204112	Motor holder plate with jam
39	1	11204113	Jam motor holder
40	4	16400216	Distance sleeve step motor
41	4	11700047	Flat round screw
42	1	11820003	Belt
43	4	11700050	Hexagon nut
44	1	11700009	Headless pin
45	1	16400342	Sleeve bevel wheel
46	1	16400347	Cover Z-axis
47	2	16400332	Guidance ledge counterbalance
49	6	11700026	Hexagon cylinder screw
51	2	11700125	Hexagon cylinder screw

3 Drawing and list of parts

3.10 Vertical slide F1410 LF **with trapezoid thread spindle**



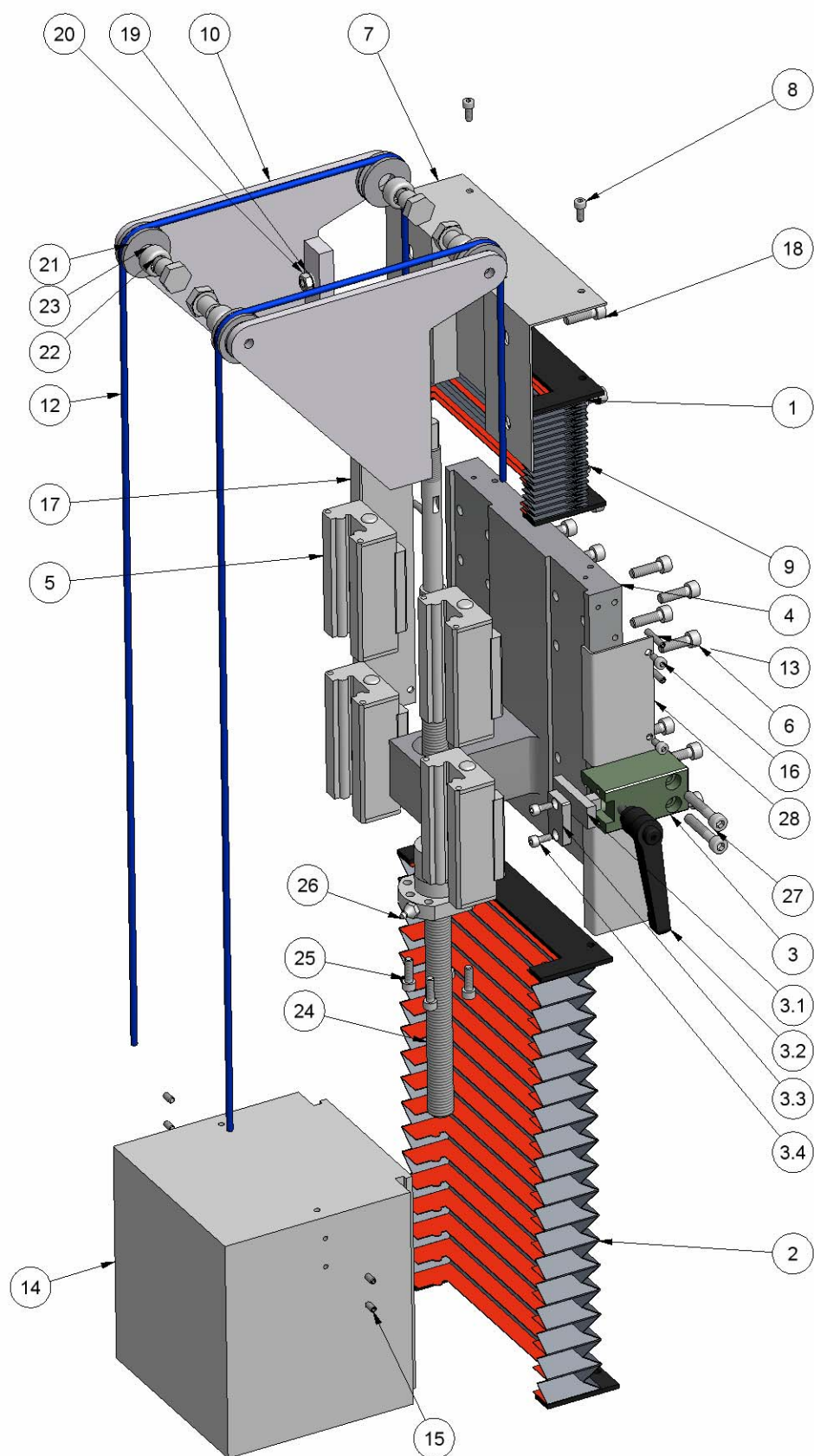
3 Drawing and list of parts

3.10.1 List of parts vertical slide F1410 LF with trapezoid thread spindle

Part-No.	Pieces	Order-No.	Designation
1	1	11860003	Concertina cover Z-axis, top
2	1	16400302	Jam
4	1	11860003	Concertina cover Z-axis, base
5	1	16400303	Vertical slide
6	4	11810026	Guidance sledge
7	16	11700031	Hexagon cylinder screw
8	1	16410208	Holding plate Z-axis, top
9	10	11700026	Hexagon cylinder screw
10	2	11700002	Hexagon nut
11	1	16400311	Spindle nut
12	1	16400312	Adjusting nut
13	4	11700070	Hexagon cylinder screw
16	1	11200327	Z-spindel
18	1	11840004	Jam lever
19	1	16400319	Jam plate
20	1	16400320	Jam
21	1	16410206	Cover
23	4	11700026	Hexagon cylinder screw
24	2	11700052	Hexagon cylinder screw
25	2	16410207	Protective cover

3 Drawing and list of parts

3.11 Vertical slide F1410 LF **with ball bearing spindle**



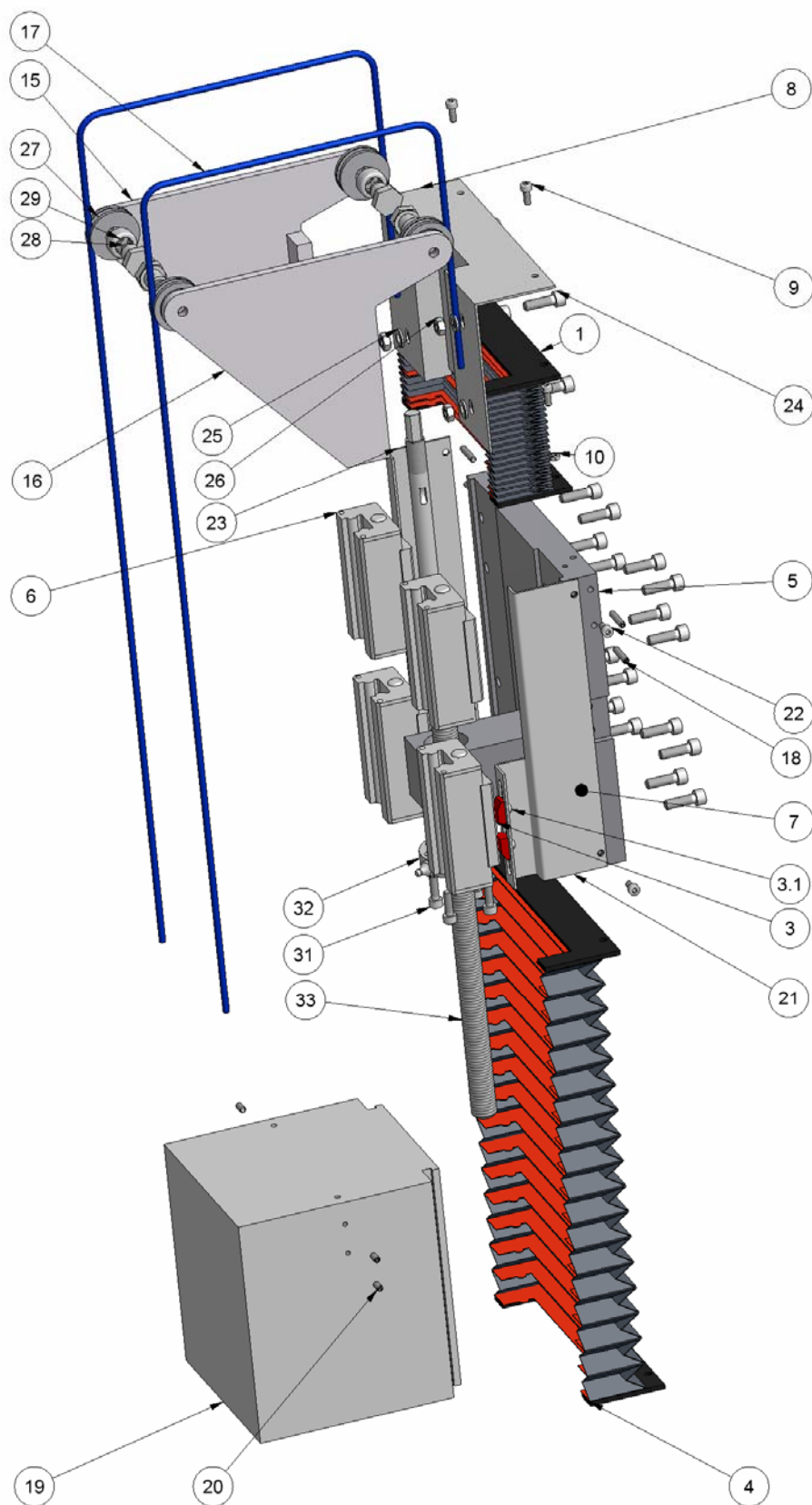
3 Drawing and list of parts

3.11 List of parts vertical slide F1410 LF with ball bearing spindle

Part-No.	Pieces	Order-No.	Designation
1	1	11860003	Concertina cover Z-axis, top
2	1	11860003	Concertina cover Z-axis, base
3	1	16400302	Jam
3.1	1	16400319	Jam plate
3.2	1	11840004	Jam lever
3.3	1	16400320	Jam
3.4	2	11700026	Hexagon cylinder screw
4	1	16400303	Vertical slide
5	4	11810026	Guidance sledge
6	16	11700031	Hexagon cylinder screw
7	1	16410208	H-metal sheet holder Z-axis, top
8	4	11700026	Hexagon cylinder screw
9	2	11700002	Hexagon nut
10	1	16400337/01	Rolling holder left
11	1	16400337/02	Rolling holder right
12	2	16400341	Wire rope
14	1	16400340	Counter balance
15	4	11700089	Headless pin
16	6	11700026	Hexagon cylinder screw
17	1	14610206	Cover
18	4	11700031	Hexagon cylinder screw
19	4	11700018	Washer
20	4	11700019	Hexagon nut
21	4	16400339	Coil wire rope
22	4	16400338	Bolt
23	4	11810027	Needle bearing
24	1	16400220-3	Ball rolling spindle
25	4	11700070	Hexagon cylinder screw
26	1	16400220	Ball rolling spindle nut
27	2	11700052	Hexagon cylinder screw
28	2	14610207	Protective cover

3 Drawing and list of parts

3.12 Vertical slide CC-F1410 LF



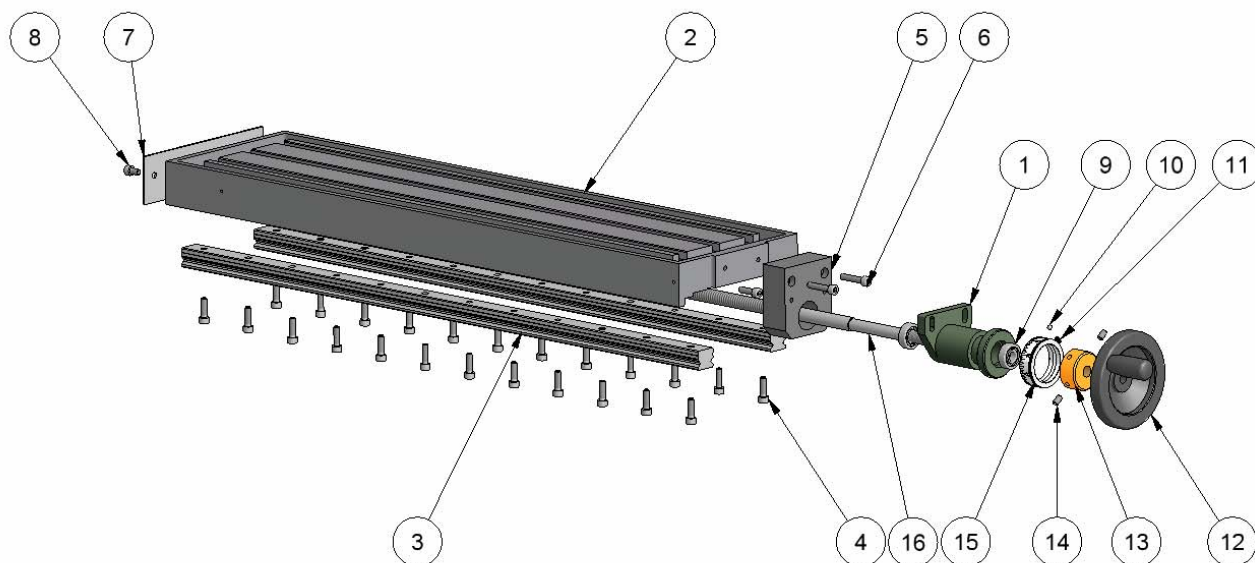
3 Drawing and list of parts

3.12.1 List of parts vertical slide CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11860003	Concertina cover Z-axis, top
3	2	16400227	Cam lever
3.1	2	11700112	Hexagon cylinder screw
4	1	11860003	Concertina cover Z-axis, base
5	1	16400303	Vertical slide
6	4	11810026	Guidance sledge
7	16	11700031	Hexagon cylinder screw
8	1	16410208	Holding plate Z-axis, top
9	4	11700026	Hexagon cylinder screw
10	2	11700002	Hexagon nut
15	1	16400337/01	Roll holder left
16	1	16400337/02	Roll holder right
17	2	16400341	Wire rope
18	4	11700089	Headless pin
19	1	16400330	Counter weight
20	4	11700089	Headless pin
21	1	16410209	Metal sheet holder cam lever
22	4	11700026	Hexagon cylinder screw
23	1	16410206	Cover
24	4	11700031	Hexagon cylinder screw
25	4	11700018	Washer
26	4	11700019	Hexagon nut
27	4	16400339	Reverse roller
28	4	16400338	Bolt
29	4	11810027	Needle bearing
31	4	11700070	Hexagon cylinder screw
32	1	16400220	Ball rolling spindle nut
33	1	16400220-3	Ball bearing spindle

3 Drawing and list of parts

3.13 Top slide F1410 LF with trapezoid thread spindle

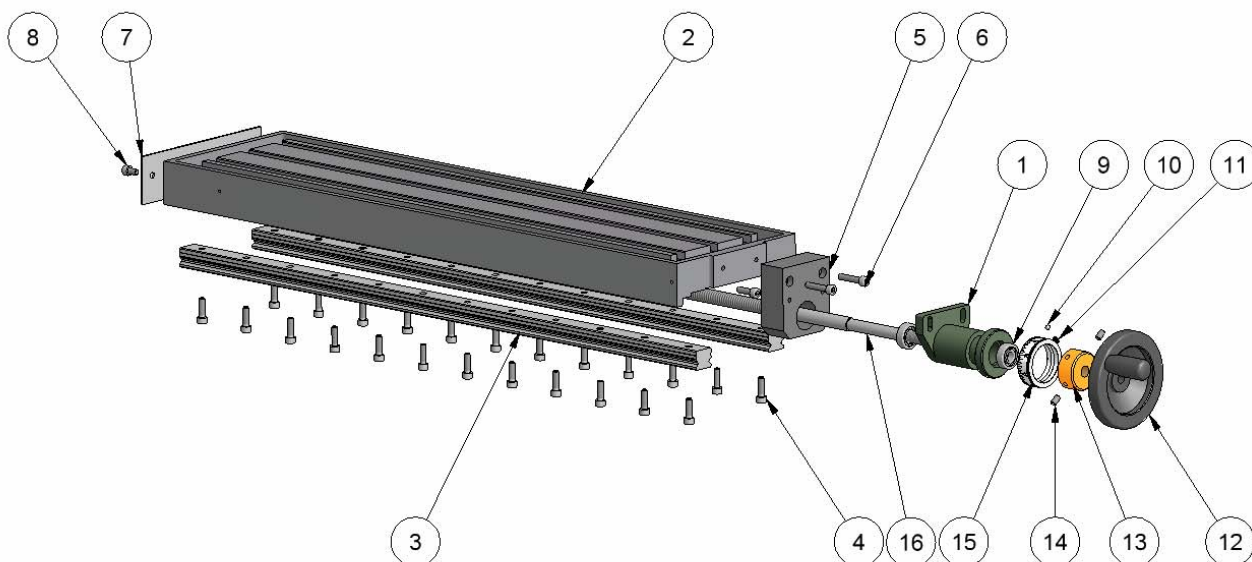


3.13.1 List of parts top slide F1410 LF with trapezoid thread spindle

Part-No.	Pieces	Order-No.	Designation
1	1	164002103	Spindle bearing
2	1	16400201	Top slide
3	2	11810028	Guide rail 700 mm
4	26	11700031	Cylinder head screw
5	1	16400212	Spindle bearing extension X-axis
6	2	11700046	Cylinder head screw
7	1	16410210	Connecting plate
8	2	11700022	Cylinder head screw
9	2	11810007	Self aligning bearing
10	1	11204022	Ball D.5
11	1	11850002	Spring
12	1	11840005	Handwheel
13	1	1120002105	Set collar
14	1	11700087	Headless pin
15	1	112002104	Graduated collar X-Y-axis trapezoid
16	1	11400206	Trapezoid thread spindle

3 Drawing and list of parts

3.14 Top slide F1410 LF **with ball bearing spindle**

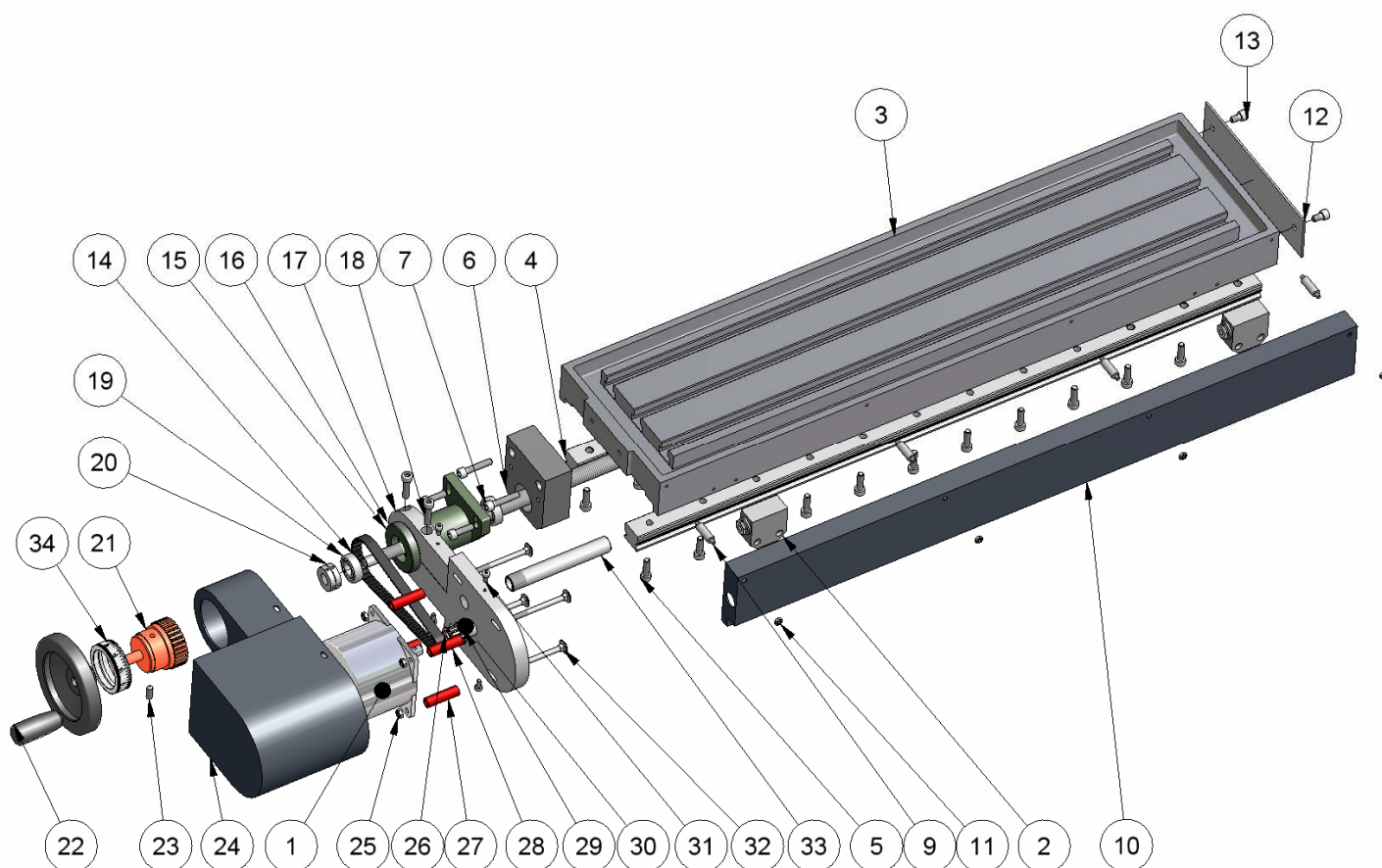


3.14.1 List of parts top slide F1410 LF **with ball bearing spindle**

Part-No.	Pieces	Order-No.	Designation
1	1	164002103	Spindle bearing
2	1	16400201	Top slide
3	2	11810028	Guide rail 700 mm
4	26	11700031	Cylinder head screw
5	1	16400212	Spindle bearing extension X-axis
6	2	11700046	Cylinder head screw
7	1	16410210	Connecting plate
8	2	11700022	Cylinder head screw
9	2	11810007	Self aligning bearing
10	1	11204022	Ball D.5
11	1	11850002	Spring
12	1	11840005	Handwheel
13	1	1120002105	Set collar
14	1	11700087	Headless pin
15	1	112452104	Graduated collar X-Y-axis ball bearing
16	1	16400220-1	Ball bearing spindle

3 Drawing and list of parts

3.15 Top slide CC-F1410 LF



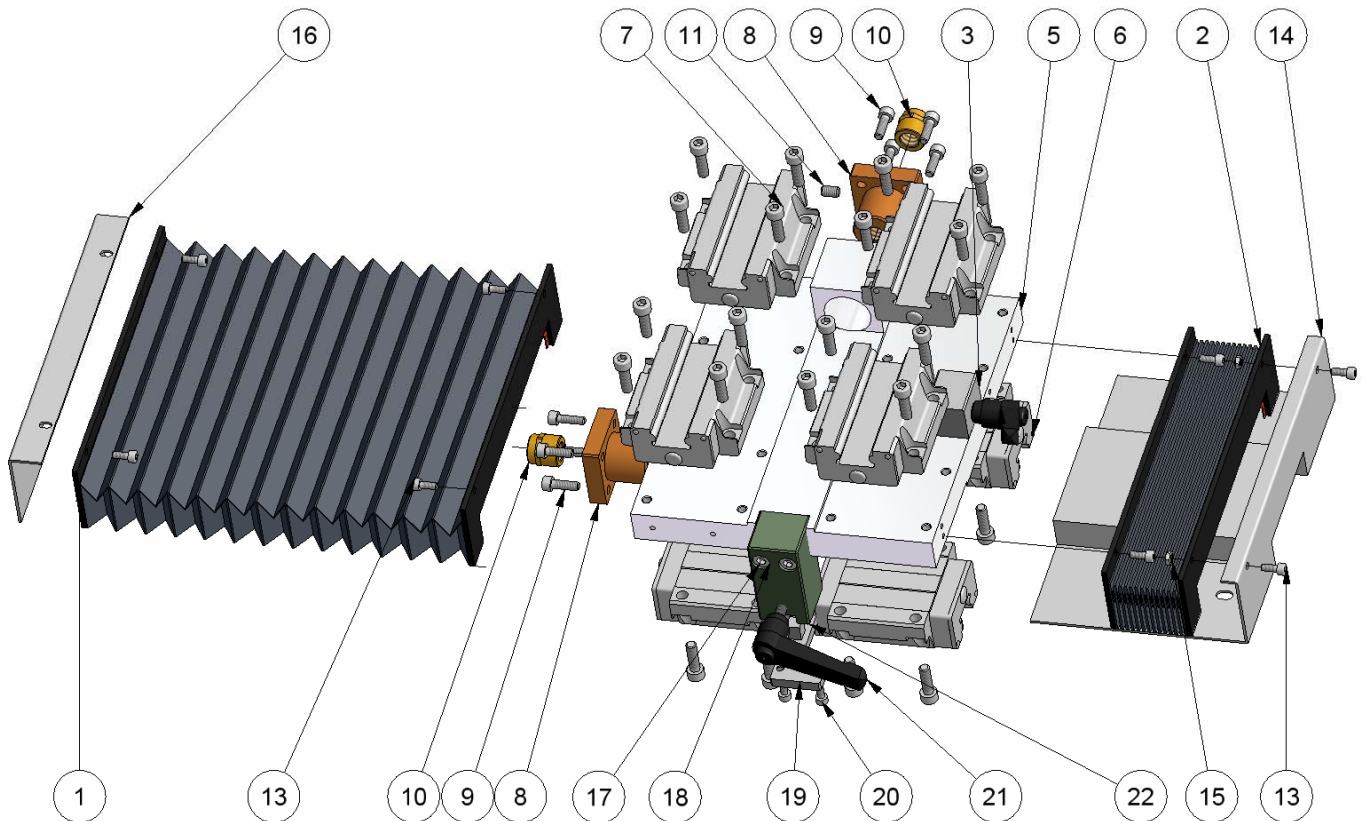
3 Drawing and list of parts

3.15.1 List of parts top slide CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11800003	Step motor
2	2	11900017	Limit switch
3	1	16400201	Top slide
4	2	11810028	Guide rail 700 mm
5	26	11700031	Cylinder head screw
6	1	16400212	Spindle bearing extension
7	2	11700046	Cylinder head screw
9	4	16400211	Spacer
10	1	16410211	Cover limit switch
11	4	11700002	Hexagon nut
12	1	16410210	Connecting plate
13	2	11700022	Cylinder head screw
14	1	11820003	Toothed belt
15	1	164002103	Spindle bearing
16	1	11204112	Holder for motor
17	1	11204113	Jam motor holder
18	2	11700115	Cylinder head screw
19	2	11810007	Self aligning bearing
20	2	164002101	Adjusting nut
21	1	16400218	Toothed belt disc
22	1	11840003	Handwheel
23	1	11700087	Headless pin
24	1	1121021217	Hood step motor
25	4	11700050	Hexagon nut
26	1	1121031913	Toothed belt wheel
27	4	16400216	Distance sleeve
28	2	1121031912	Location washer
29	2	11700048	Lock ring
30	1	11700099	Spiral clamping pin
31	4	11700013	Cylinder head screw
32	4	11700047	Truss head bolt
33	1	16400215	Tube X-axis
34	4	112452104	Graduated collar

3 Drawing and list of parts

3.16 Cross slide F1410 LF **with trapezoid thread spindle**

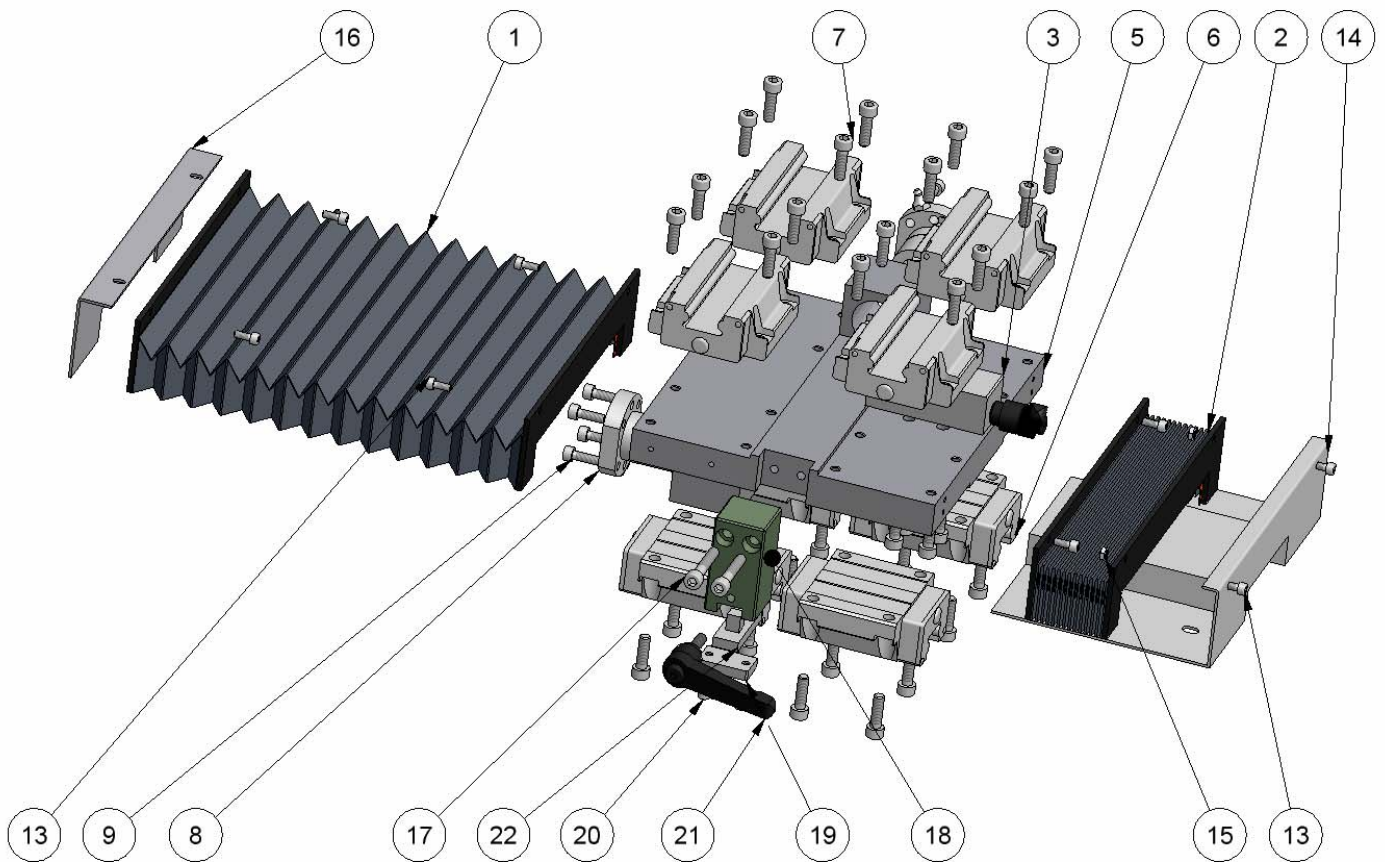


3.16.1 List of parts cross slide F1410 LF **with trapezoid thread spindle**

Part-No.	Pieces	Order-No.	Designation
1	1	11860004	Concertina cover, rear
2	1	11860004	Concertina cover, front
3	1	11810029	Clamper unit
5	1	16400202	Cross slide
6	8	11810026	Guide carriage
7	32	11700031	Cylinder head screw
8	2	16400208	Nut
9	8	11700070	Hexagon screw
10	2	16400209	Adjusting nut
11	2	11700087	Headless pin
13	8	11700070	Cylinder head screw
14	1	16410212	Holding plate
15	2	11700002	Hexagon nut
16	1	16410213	Holding plate
17	2	11700052	Cylinder head screw
18	1	16400302	Clamper housing
19	1	16400319	Clamper plate
20	2	11700026	Cylinder head screw
21	1	11840006	Clamping lever
22	1	16400320	Clamper

3 Drawing and list of parts

3.17 Cross slide F1410 LF **with ball bearing spindle**

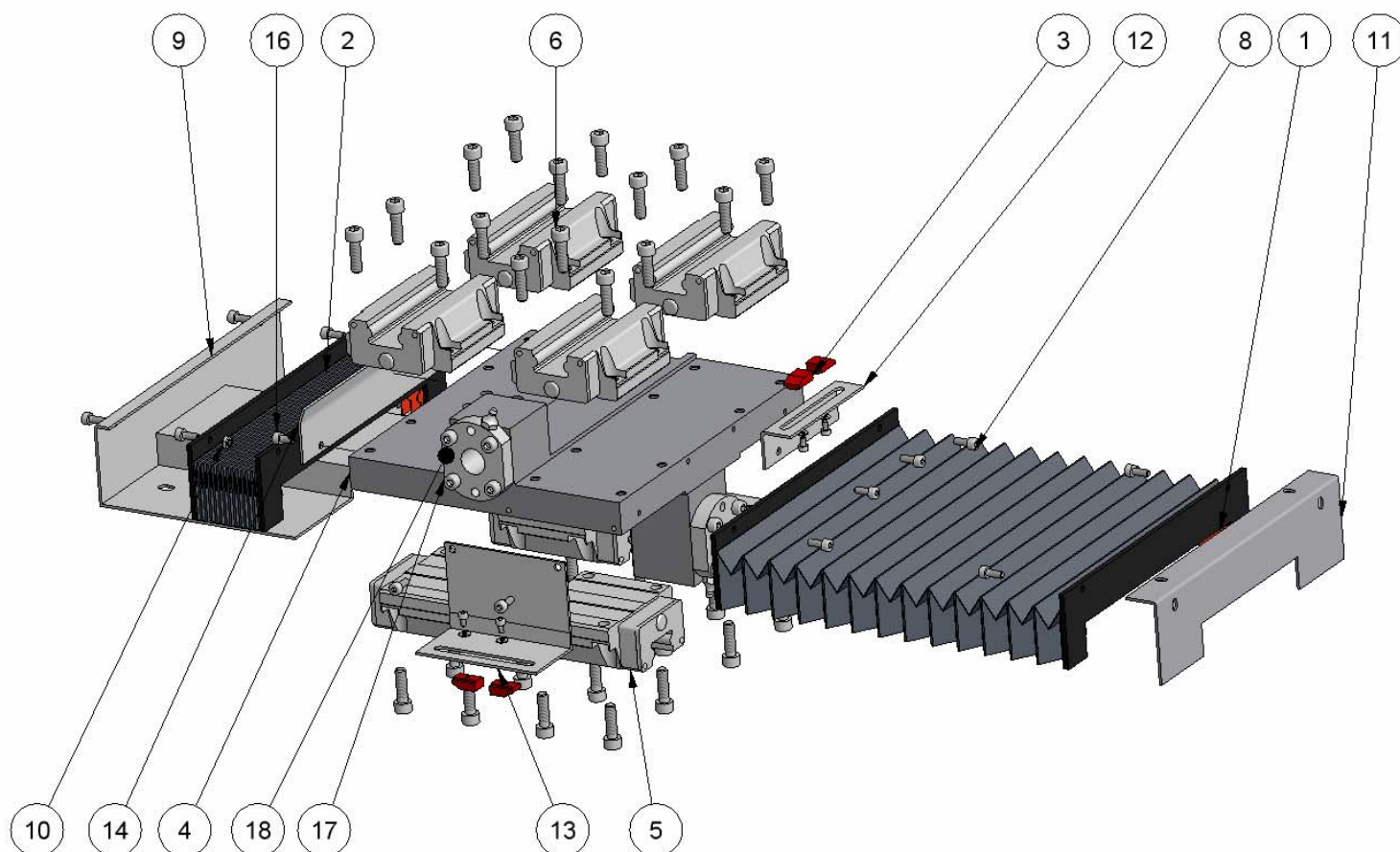


3.17.1 List of parts cross slide F1410 LF **with ball bearing spindle**

Part-No.	Pieces	Order-No.	Designation
1	1	11860004	Concertina cover, rear
2	1	11860004	Concertina cover, front
3	1	11810029	Clamber unit
5	1	16400202	Cross slide
6	8	11810026	Guide carriage
7	32	11700031	Cylinder head screw
8	2	16400220	Ball rolling spindle nut
9	8	11700070	Cylinder head screw
13	8	11700070	Cylinder head screw
14	1	16410212	Holding plate
15	2	11700002	Hexagon nut
16	1	16410213	Metal sheet holder
17	2	11700052	Cylinder head screw
18	1	16400302	Clamber housing
19	1	16400319	Clamp lever
20	2	11700026	Cylinder head screw
21	1	11840006	Clamping lever
22	1	16400320	Clamber

3 Drawing and list of parts

3.18 Cross slide CC-F1410 LF

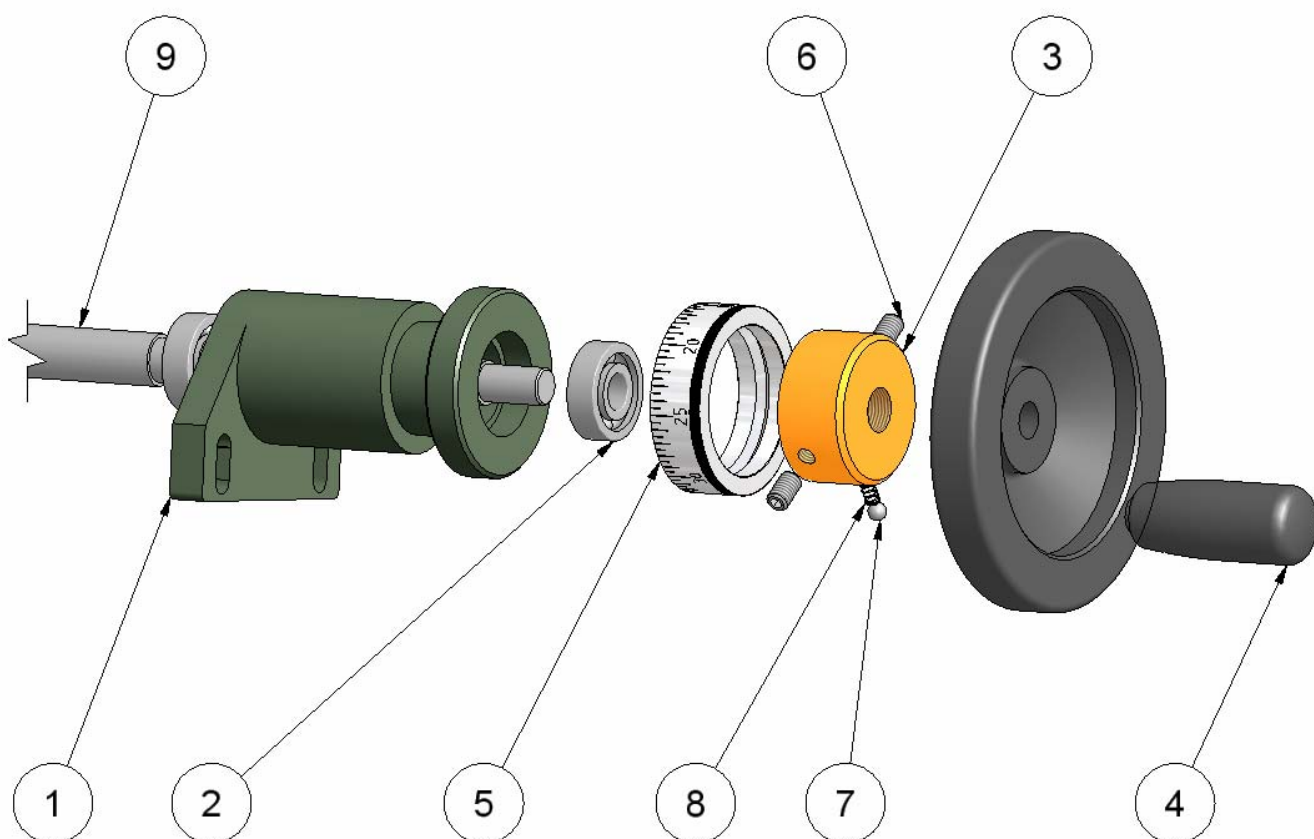


3.18.1 List of parts cross slide CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11860004	Concertina cover
2	1	11860004	Concertina cover
3	4	16400227	Switch cams
4	1	16400202	Cross slide
5	8	11810026	Guide carriage
6	32	11700031	Cylinder head screw
8	12	11700070	Cylinder head screw
9	1	16410212	Holding plate Y-axis
10	2	11700002	Hexagon nut
11	1	16410213	Holding plate
12	1	16410214	Holding plate cam lever X-axis
13	1	16410215	Holding plate cam lever Y-axis
14	1	16410216	Linear guide cover
16	2	11700026	Cylinder head screw
17	2	16400220	Ball rolling spindle nut
18	8	11700070	Cylinder head screw

3 Drawing and list of parts

3.19 Y-spindle F1410 LF with trapezoid thread spindle

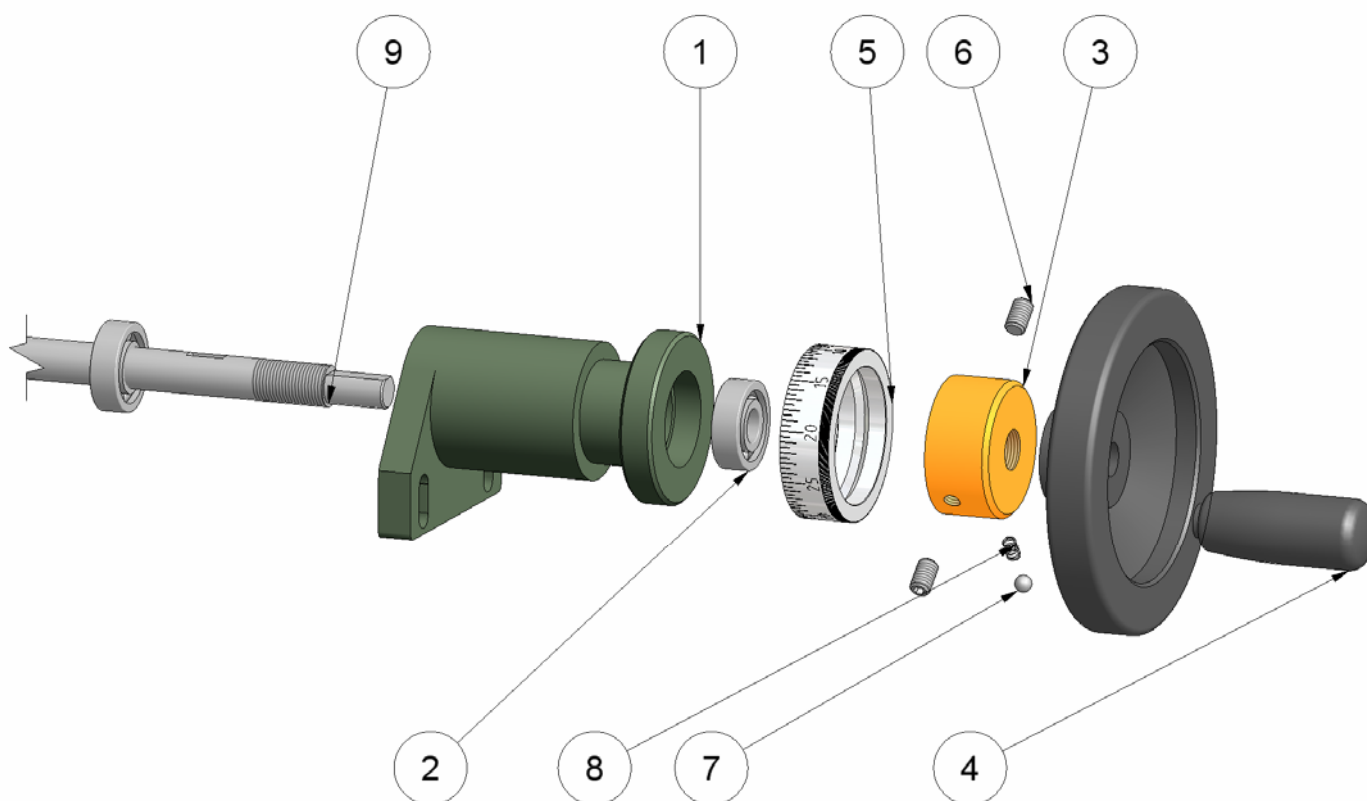


3.19.1 List of parts Y-spindle F1410 LF with trapezoid thread spindle

Part-No.	Pieces	Order-No.	Designation
1	1	164002103	Spindle bearing
2	2	11810007	Self aligning bearing
3	1	112002105	Set collar
4	1	11840005	Handwheel
5	1	112002104	Graduated collar
6	2	11700087	Headless pin
7	1	11204022	Ball D.5
8	1	11850002	Spring
9	1	11200207	Trapezoid thread spindle

3 Drawing and list of parts

3.20 Y-spindle F1410 LF **with ball bearing spindle**

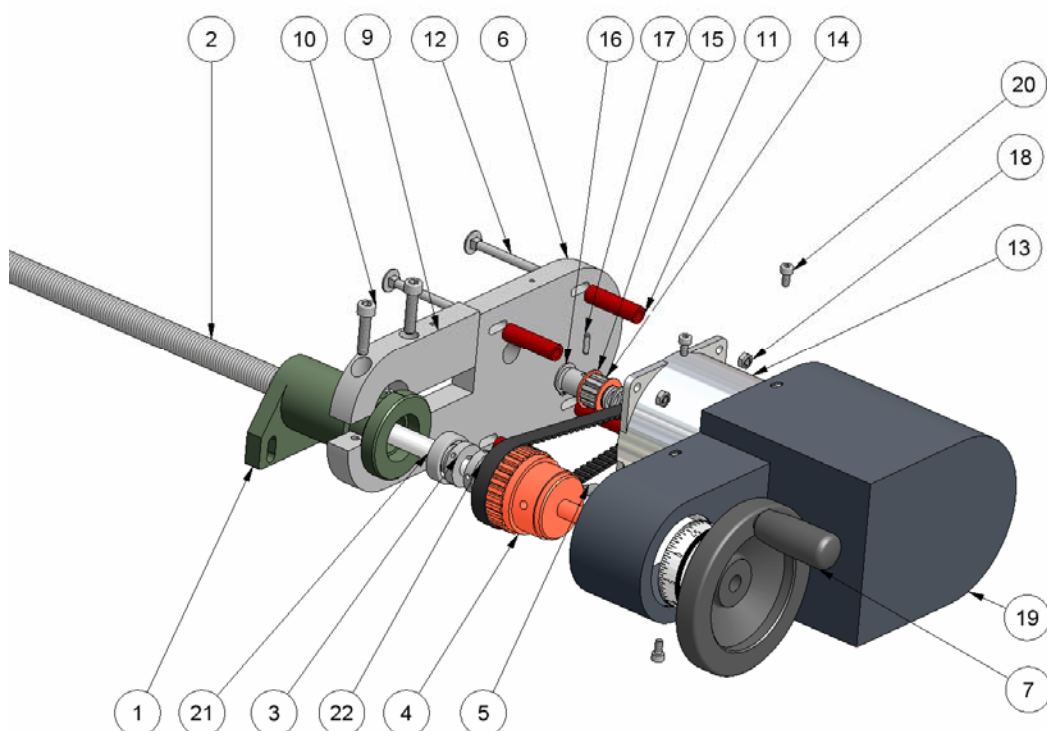


3.20.1 List of parts Y-spindle F1410 LF **with ball bearing spindle**

Part-No.	Pieces	Order-No.	Designation
1	1	164002103	Spindle bearing
2	2	11810007	Self aligning bearing
3	1	112002105	Set collar
4	1	11840005	Handwheel
5	1	112452104	Graduated collar
6	2	11700087	Headless pin
7	1	11204022	Ball D.5
8	1	11850002	Spring
9	1	16400220-2	Ball bear spindle

3 Drawing and list of parts

3.21 Y-spindle CC-F1410 LF

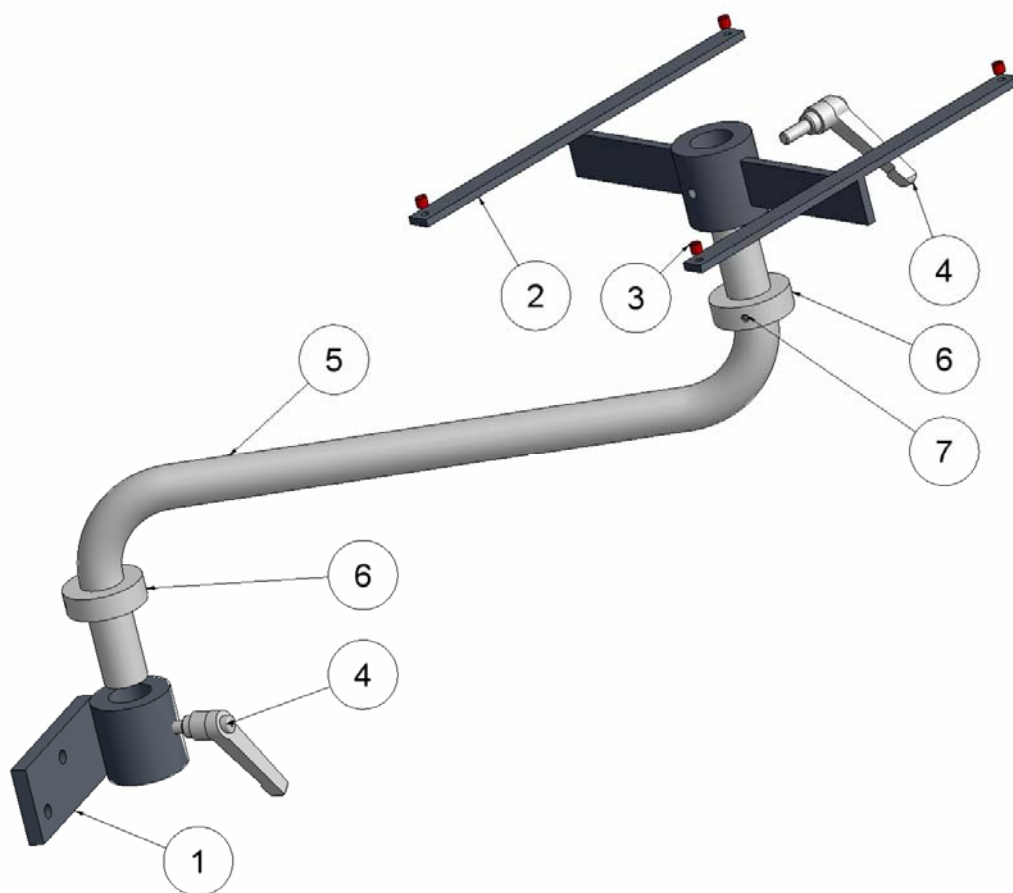


3.21 List of parts Y-spindle CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	164002103	Spindle bearing
2	1	16400220-2	Ball bear spindle
3	2	164002101	Adjusting nut
4	1	16400218	Toothed belt disc
5	1	11700087	Headless pin M6x16 DIN914
6	1	112452104	Graduated collar
7	1	11840003	Handwheel
8	1	11204112	Motor holder plate with jam
9	1	11204113	Motor holder plate with jam
10	2	11700115	Cylinder head screw
11	4	16400216	Distance sleeve step motor
12	4	11700047	Truss head bolt
13	1	11800003	Step motor
14	1	1121031913	Toothed belt wheel Z12
15	2	1121031912	Location washer Z12
16	2	11700048	Lock ring
17	1	11700049	Spiral clamping pin
18	4	11700050	Hexagon nut
19	1	1121021217	Protective cover step motor
20	4	11700013	Cylinder head screw M4x8 DIN912
21	2	11810007	Self aligning bearing
22	1	11820003	Toothed belt

3 Drawing and list of parts

3.22 Arm for control station

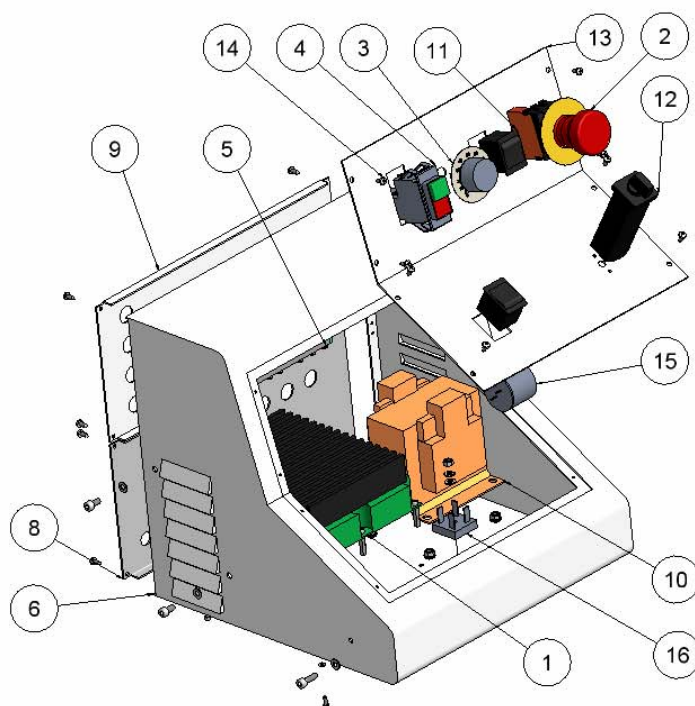
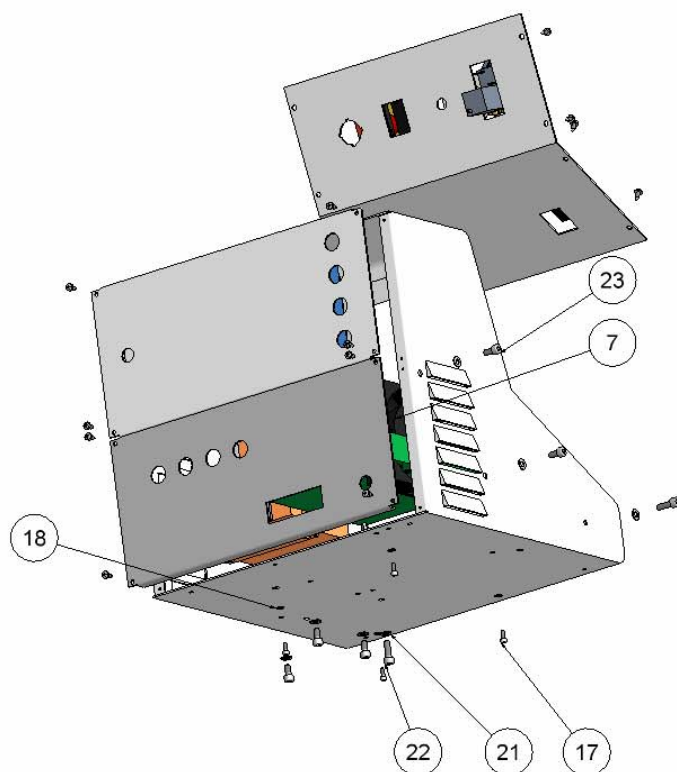


3.22.1 List of parts for the arm of control station

Part-No.	Pieces	Order-No.	Designation
1	1	16400501	Arm retainer
2	1	16400502	Arm retainer
3	4	16400503	Spacer
4	2	11840004	Clamping lever
5	1	16400500	Control panel arm
6	2	16400504	Ring end position
7	4	11700079	Headless pin

3 Drawing and list of parts

3.23 Control station **milling plus 1,4 kW**



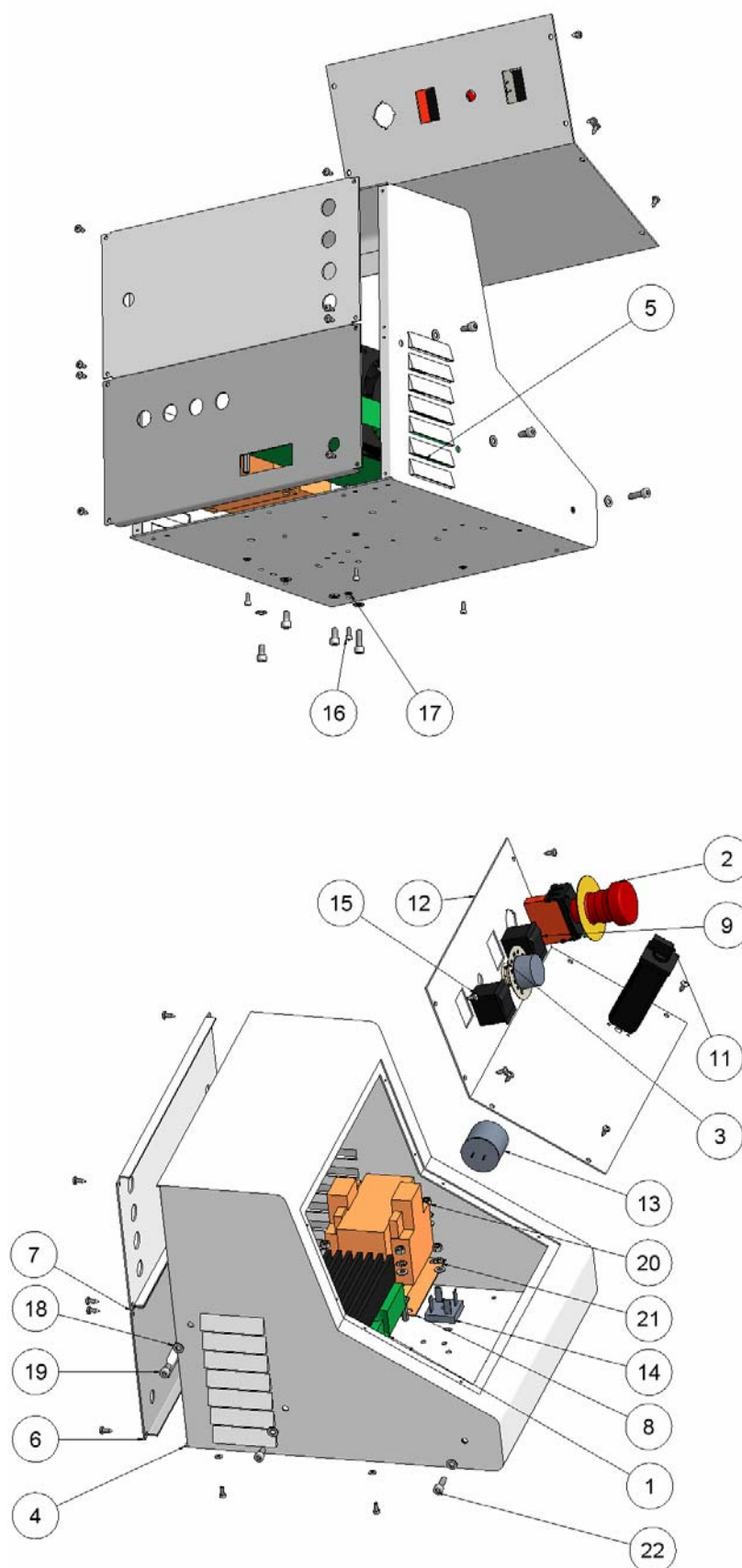
3 Drawing and list of parts

3.23.1 List of parts for control station **milling plus 1,4 kW**

Part-No.	Pieces	Order-No.	Designation
1	1	11800009	Circuit board of CNC control
2	1	11800008	Emergency OFF switch
3	1	11800004	Potentiometer
4	1	11800001	Main switch
5	1	11800005	Circuit board
6	1	11200504	Control unit housing
7	1	11200501	Ventilation
8	1	11200508	Circuit board plate
9	1	11200509	Cap, top
10	1	11800013	Transformer
11	2	11800021	Bat handle switch
12	1	11800010	Cam-operated switch
13	1	11200513	Switch cover
14	16	11700003	Tapping screw
15	1	11800022	Condenser
16	1	11800012	Dector bridge
17	4	11700116	Cylinder head screw
18	4	11700117	Washer
19	5	11700050	Hexagon nut
20	5	11700118	Locking washer
21	12	11700088	Washer
22	2	11700070	Cylinder head screw
23	5	11700119	Cylinder head screw

3 Drawing and list of parts

3.24 Control station **milling plus 2,0 kW**



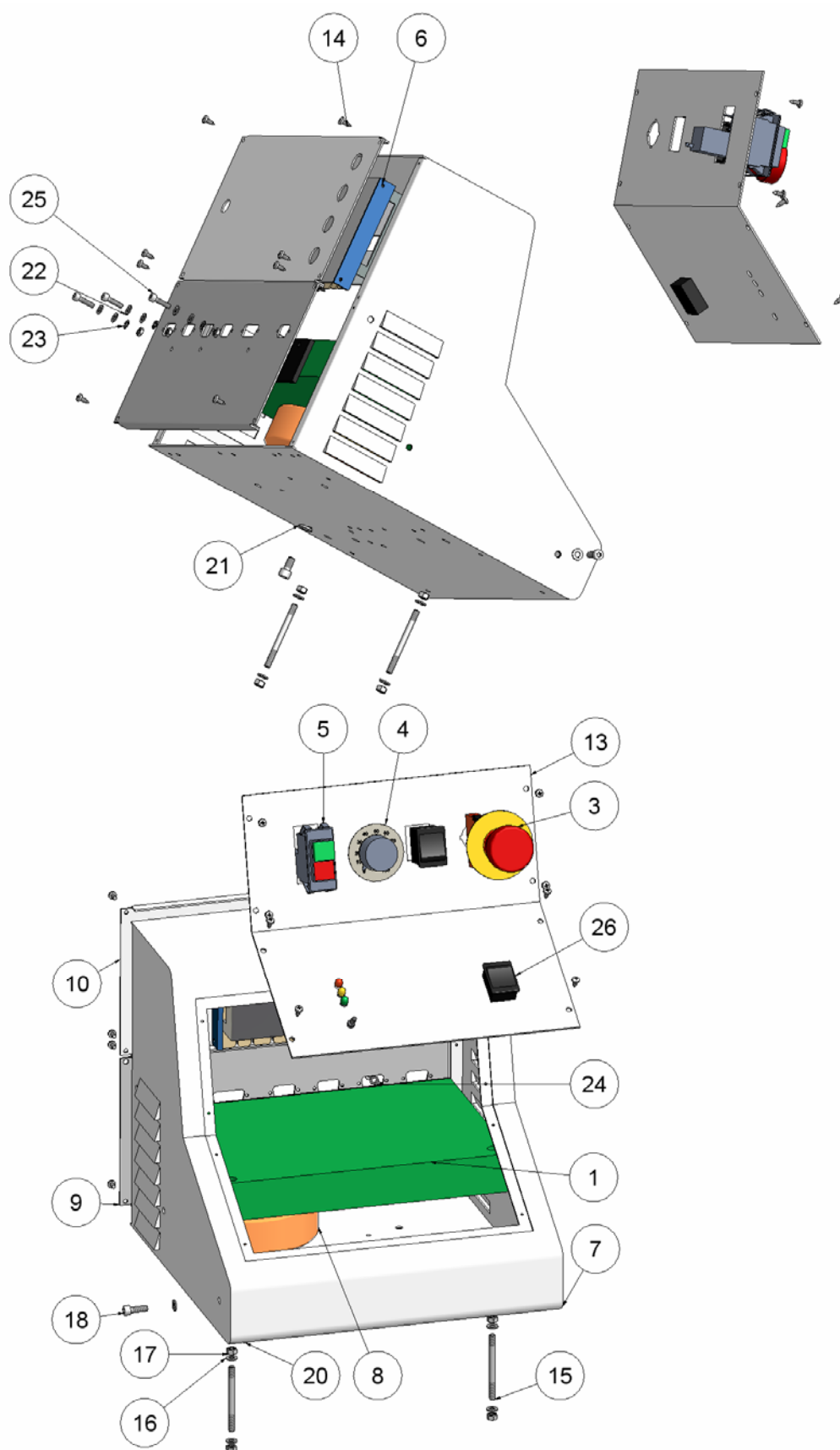
3 Drawing and list of parts

3.24.1 List of parts for control station **milling plus 2,0 kW**

Part-No.	Pieces	Order-No.	Designation
1	1	11800009	Circuit board of CNC control
2	1	11800008	Emergency OFF switch
3	1	11800026	Potentiometer
4	1	11200504	Control unit housing
5	1	11200501	Ventilation
6	1	11200508	Circuit board plate
7	1	11200509	Cap, top
8	1	11800013	Transformer
9	1	11800021	Bat handle switch
11	1	11800010	Cam-operated switch
12	1	11200512	Switch cover
13	1	11800022	Condenser
14	1	11800012	Dector bridge
15	16	11700003	Tapping screw
16	4	11700116	Cylinder head screw
17	4	11700117	Washer
18	12	11700088	Washer
19	5	11700119	Cylinder head screw
20	5	11700050	Hexagon nut
21	5	11700118	Locking washer
22	2	11700070	Cylinder head screw
23	1	11800023	Bat handle switch

3 Drawing and list of parts

3.25 Control station **nccad 1,4 kW**



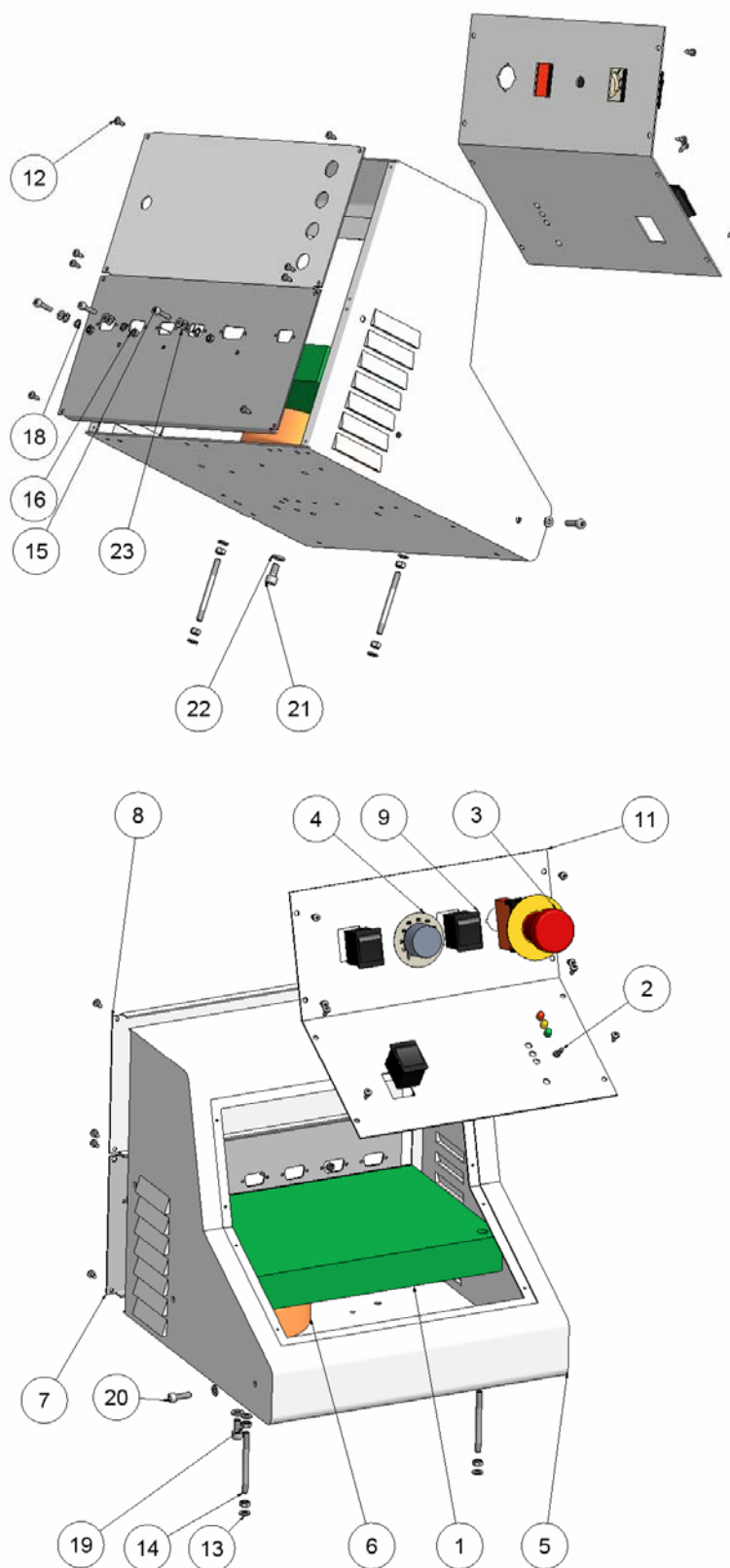
3 Drawing and list of parts

3.25.1 List of parts for control station **nccad 1,4 kW**

Part-No.	Pieces	Order-No.	Designation
1	1	11800024	4-axis control circuit board
3	1	11800008	Emergency OFF switch
4	1	11800004	Potentiometer
5	1	11800001	Main switch
6	1	11800019	Speed control board
7	1	11200504	Control unit housing
8	1	11800025	Ring transformer
9	1	11200519	Circuit board plate
10	1	11200509	Cap, top
13	1	11200513	Switch cover
14	16	11700003	Tapping screw
16	6	11700088	Washer
17	5	11700050	Hexagon nut
18	1	11700070	Cylinder head screw
19	1	11700118	Locking washer
20	1	11700059	Cylinder head screw
21	1	11700018	Washer
22	6	11700038	Washer
23	3	11700120	Locking washer
24	3	11700002	Hexagon nut
25	3	11700004	Cylinder head screw
26	2	11800021	Bat handle switch

3 Drawing and list of parts

3.26 Control station **nccad 2,0 kW**



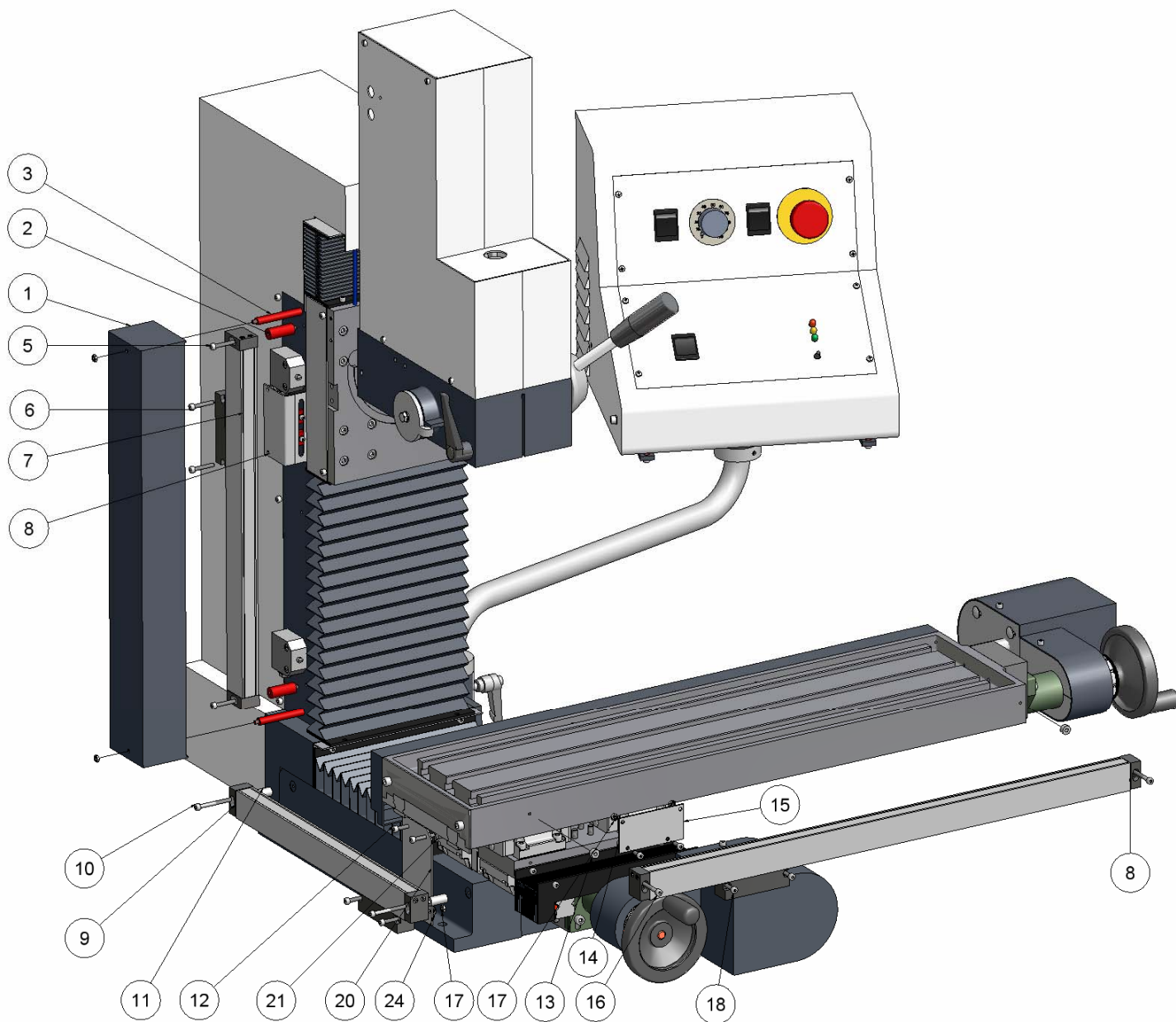
3 Drawing and list of parts

3.26.1 List of parts for control station **nccad 2,0 kW**

Part-No.	Pieces	Order-No.	Designation
1	1	11800024	4-axis control circuit board
3	1	11800008	Emergency OFF switch
4	1	11800026	Potentiometer
5	1	11200504	Control unit housing
6	1	11800025	Ring transformer
7	1	11200519	Circuit board plate
8	1	11200509	Cap, top
9	1	11800021	Bat handle switch
11	1	11200511	Switch cover
12	16	11700003	Tapping screw
13	6	11700088	Washer
15	3	11700004	Cylinder head screw
16	3	11700002	Hexagon nut
17	1	11700118	Locking washer
18	3	11700120	Locking washer
19	5	11700050	Hexagon nut
20	1	11700070	Cylinder head screw
21	1	11700059	Cylinder head screw
22	1	11700018	Washer
23	6	11700038	Washer
24	2	11800023	Bat handle switch

3 Drawing and list of parts

3.27 Mounting for linear measuring scales



3 Drawing and list of parts

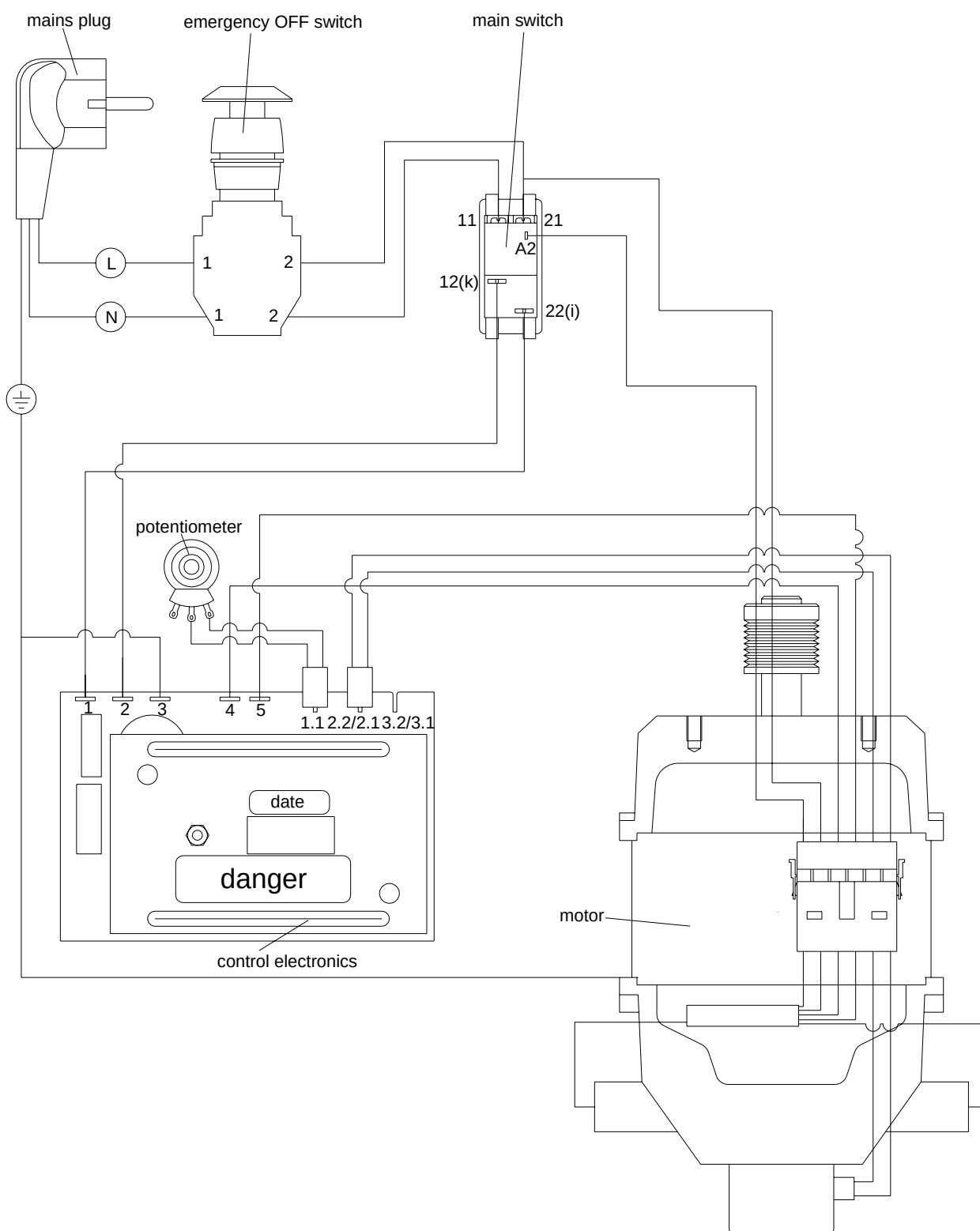
3.27.1 List of parts mounting for linear measuring scales

Part-No.	Pieces	Order-No.	Designation
1	1	16410217	Cover limit switch Z-axis
2	2	16400219	Spacer linear scale
3	2	16400210	Spacer end switch
4	2	11700002	Hexagon nut
5	2	11700121	Cylinder head screw
6	2	11700121	Cylinder head screw
7	1	11385	Linear measuring scale 320 mm
8	1	16410218	Holding plate cam lever Z-axis
9	1	11386	Linear measuring scale 520 mm
10	2	11700122	Cylinder head screw
11	2	16400221/04	Distance sleeve 20 mm
12	2	11700121	Cylinder head screw
13	2	16400221/02	Distance sleeve 5 mm
14	2	16400221/01	Distance sleeve 3 mm
15	1	16410219	Metal sheet holder X-axis
16	2	11700122	Cylinder head screw
17	4	11700002	Hexagon nut
18	2	11700013	Cylinder head screw
20	1	16410220	Holding plate Y-axis
21	2	16400221/03	Distance sleeve 17,3 mm
24	2	11700038	Washer

4 Circuit diagram

4.1 Motor 1,4 kW

This document shows all units of the electrical parts
including the mains connection

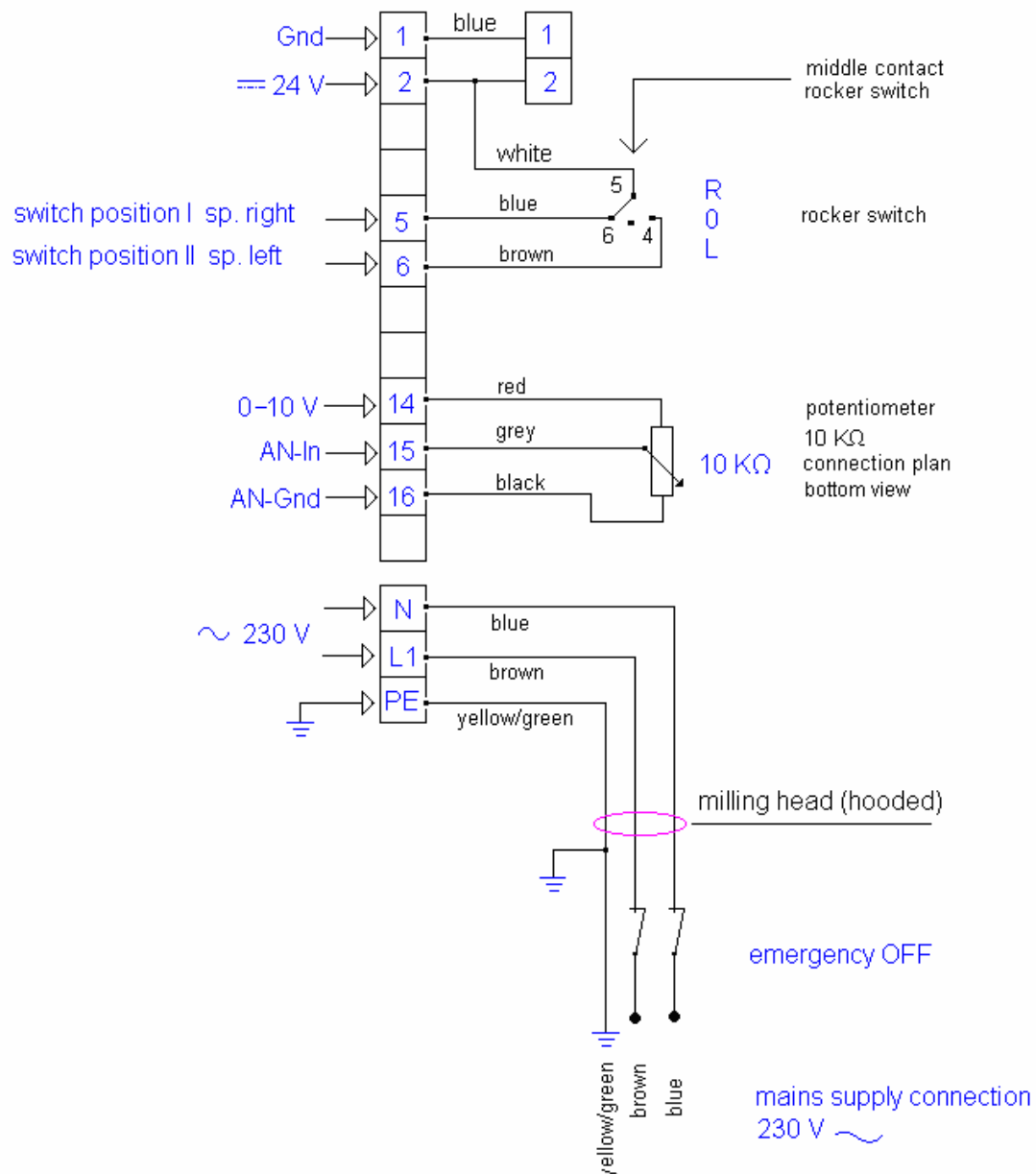


4 Circuit diagram

4.2 High speed motor 2,0 kW

This document shows all units of the electrical parts
including the mains connection

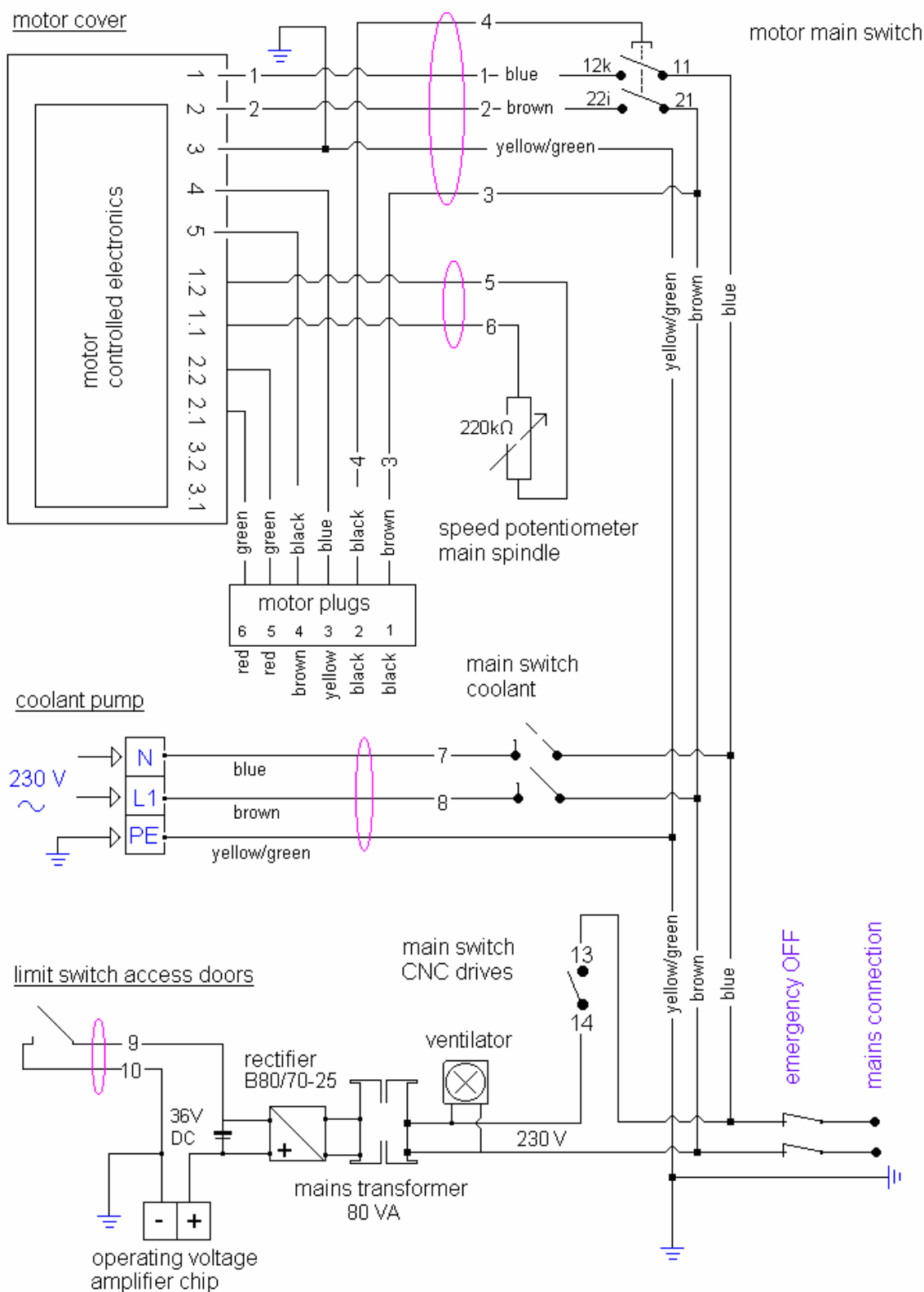
connector box motor



4 Circuit diagram

4.3 Motor 1,4 kW with safety cabin

This document shows all units of the electrical parts including the mains connection

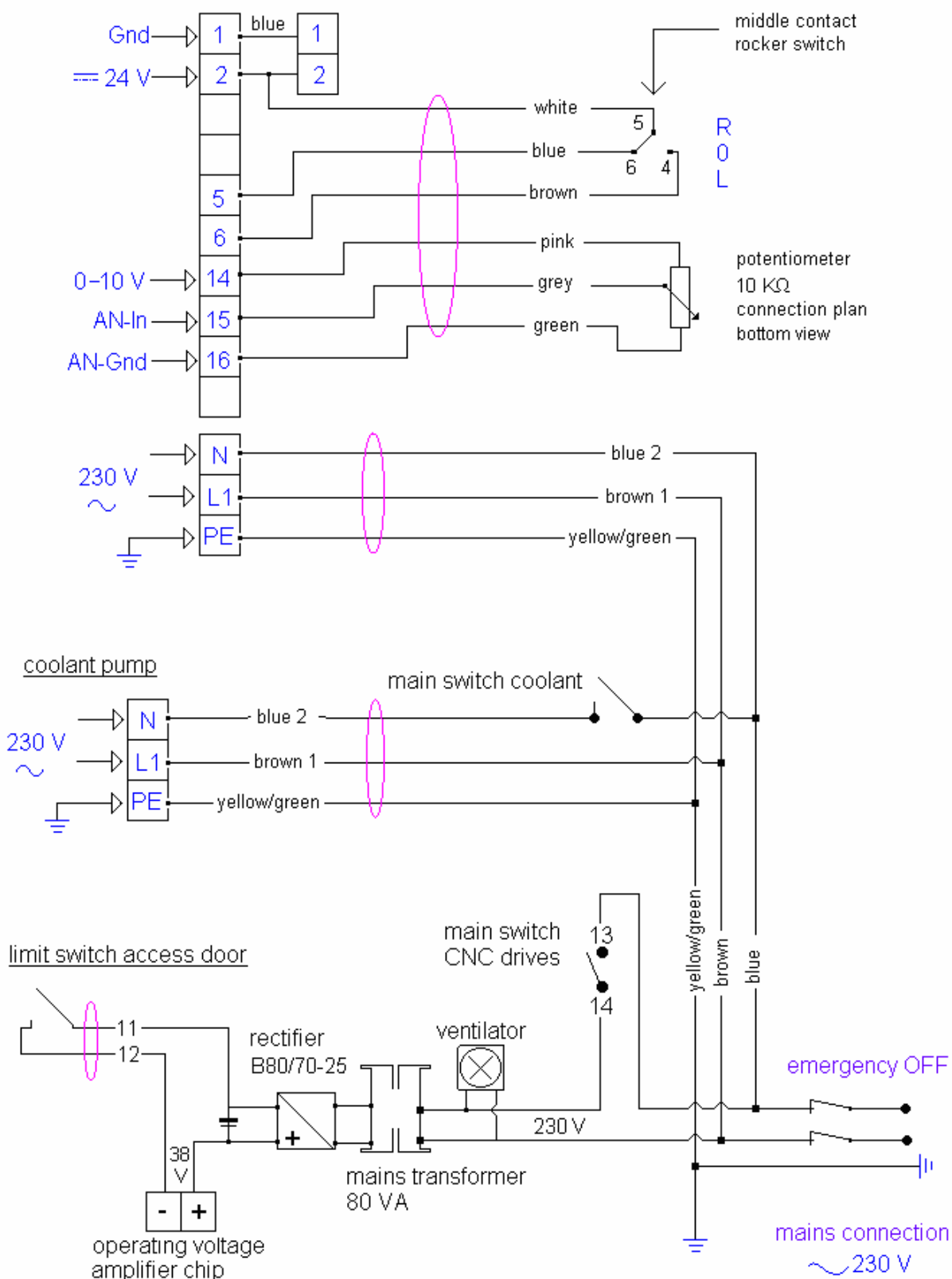


4 Circuit diagram

4.3.1 High speed motor 2,0 kW with safety cabin

This document shows all units of the electrical parts
including the mains connection

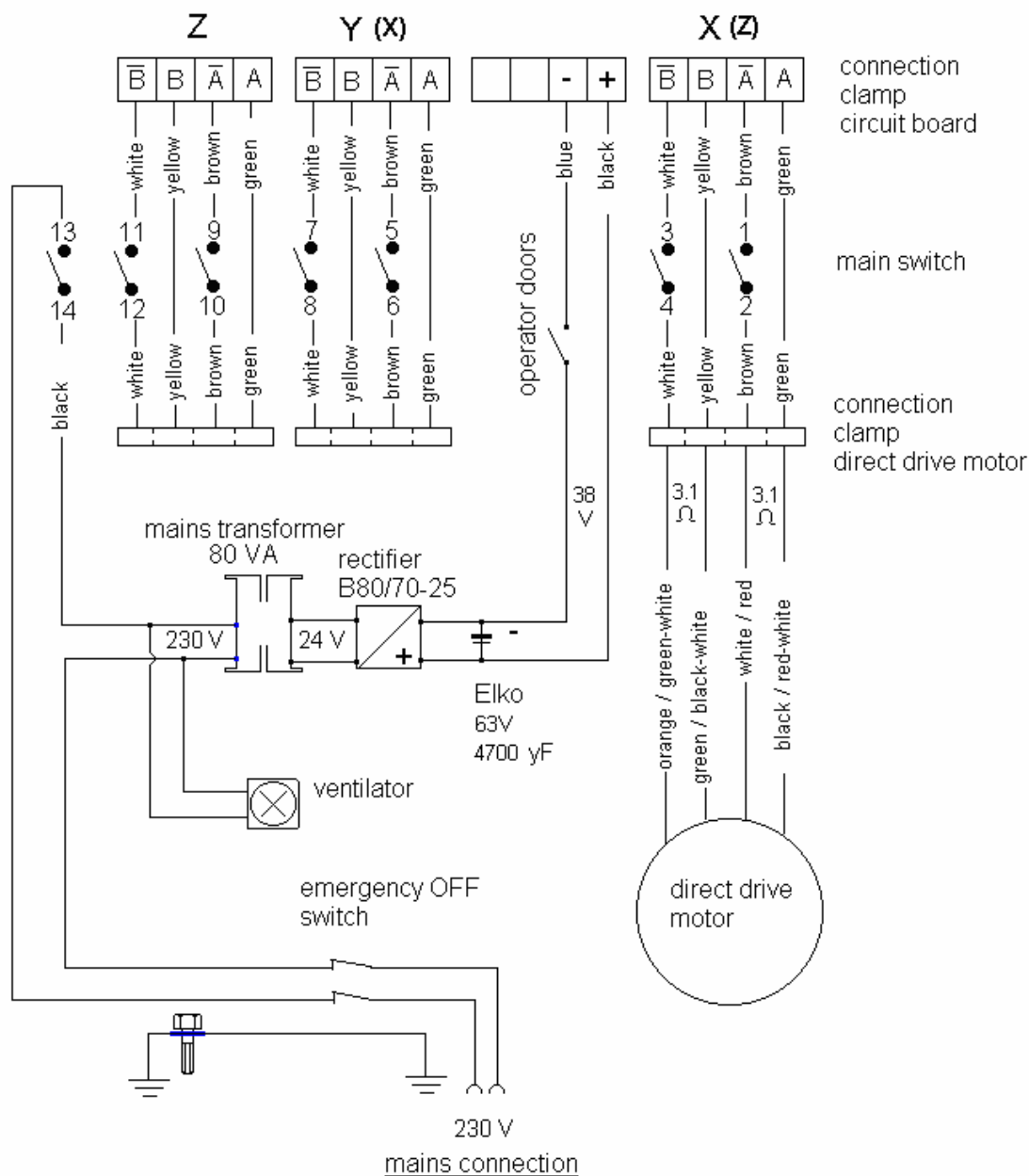
motor connector box



4 Circuit diagram

4.4 Drive motor of the CNC control

This document shows all units of the electrical parts including the mains connection



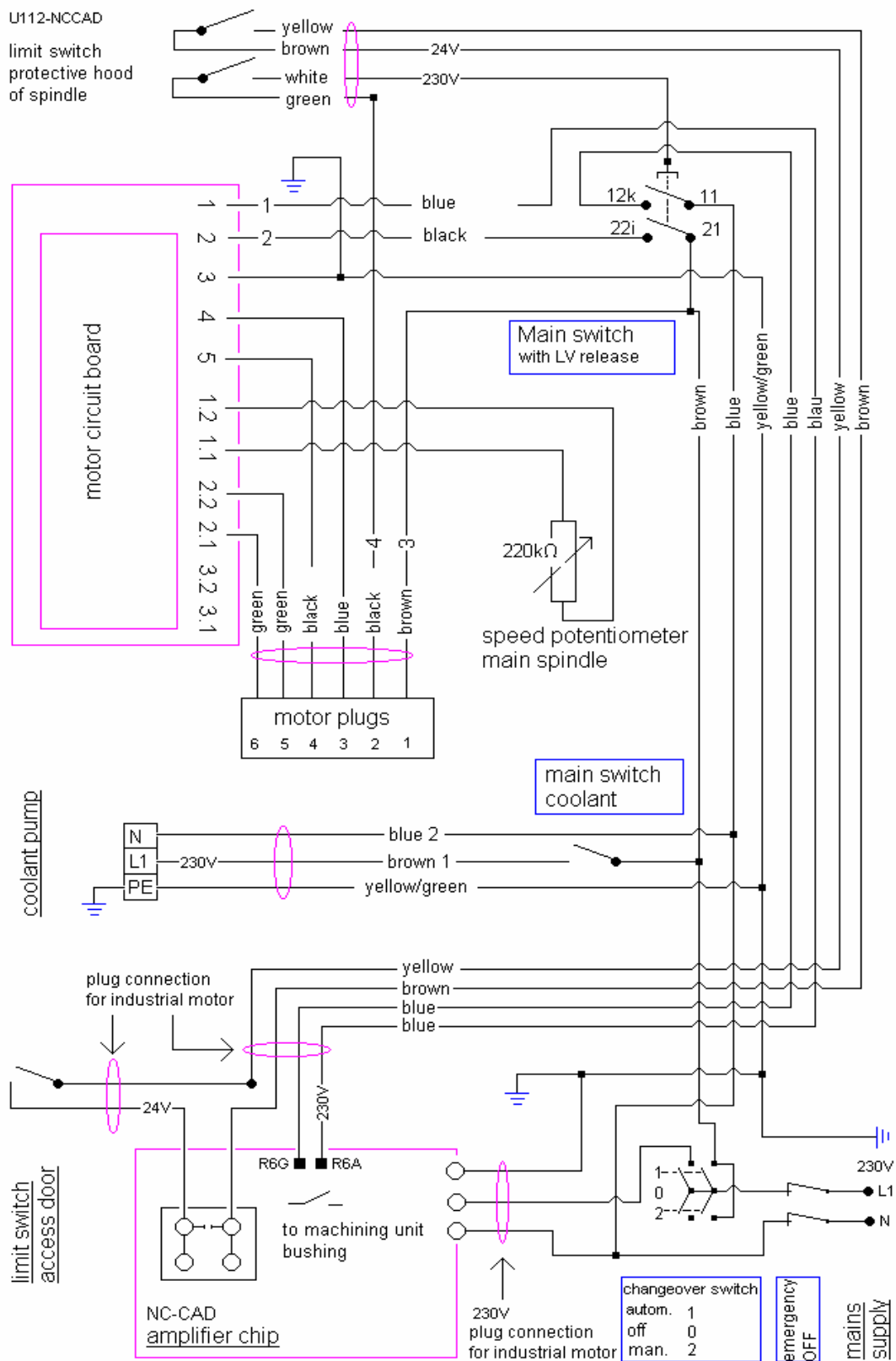
to change axial direction
exchange green for brown

(Z) (X) = for CC-D

4 Circuit diagram

4.5 Motor 1,4 kW nccad control

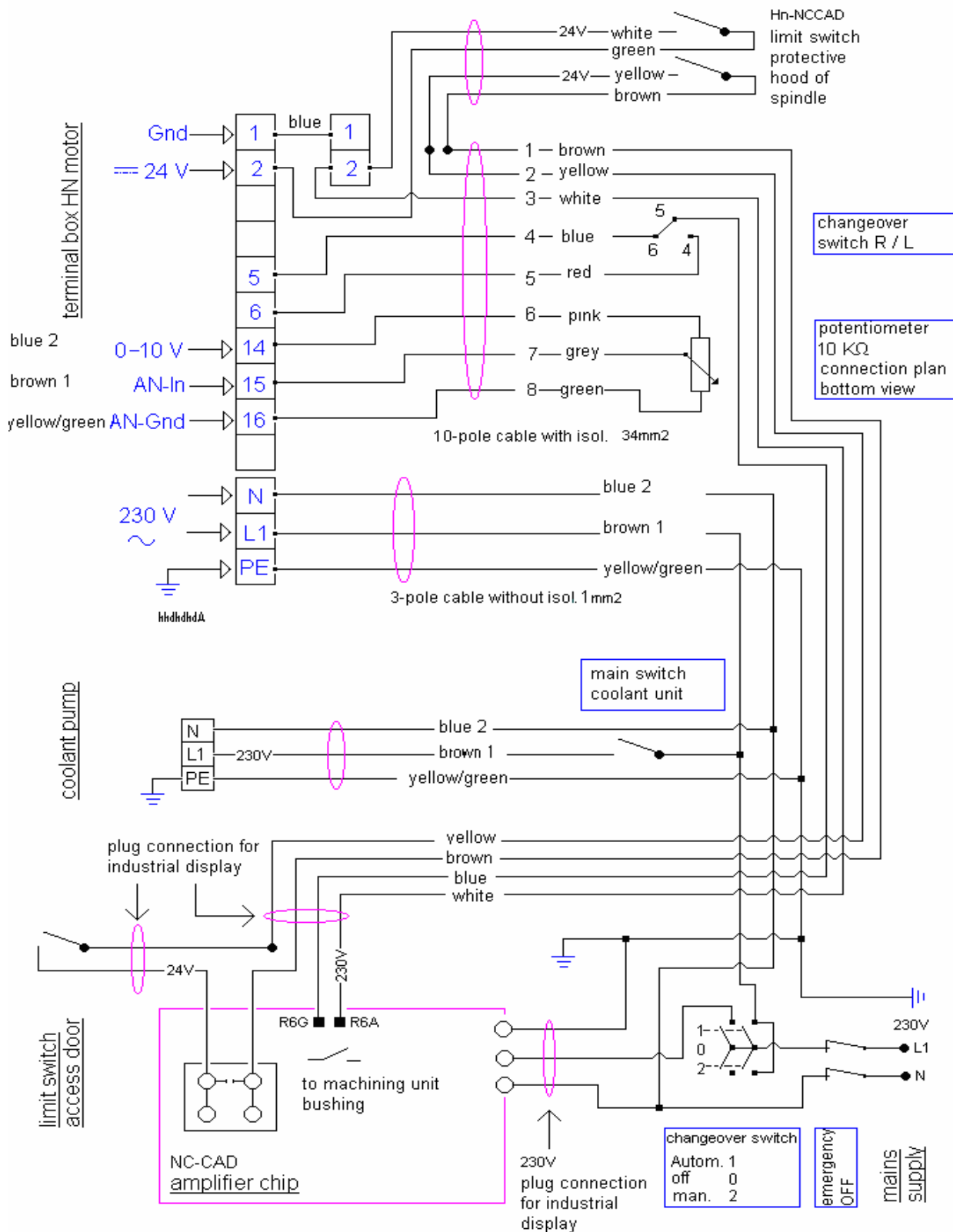
This document shows all units of the electrical parts including the mains connection



4 Circuit diagram

4.5.1 High speed motor 2,0 kW nccad control

This document shows all units of the electrical parts including the mains connection



5. Delivery and installation

The drilling and milling machines are carefully packed in our factory.

Please check the following upon receipt of delivery:

- 1. whether the packaging has been damaged and/or:**
- 2. whether the drilling and milling machine shows signs of transport damage or if there are reasons for complaints. In this case we request your immediate notification. Claims made at a later date cannot be considered.**

The drilling and milling machine must be installed on an appropriate, level and firm base.

This would be, for example:

- a base cabinet such as in our accessories' programme
- own work bench as long as it is strong enough to carry the weight of the machine without warping (see technical data and check with spirit level) and has an even surface
- a steel plate

The drilling and milling machine must be firmly screwed down onto the base. To facilitate this, there are 10 mm holes in the machine base. Good results and a minimum of vibration during operation can only be guaranteed if the above mentioned requirements for secure mounting have been adhered to.

The installation of the machine should take place where there is sufficient lighting, electrical cables with earthed sockets and 0-conductors are installed adequately near to the machine so that the mains connection lead is not subject to any tension whatsoever. The mains lead should be so that, by means of a multiple socket, a coolant or lubrication unit can also be connected.

6. Starting-up and maintenance

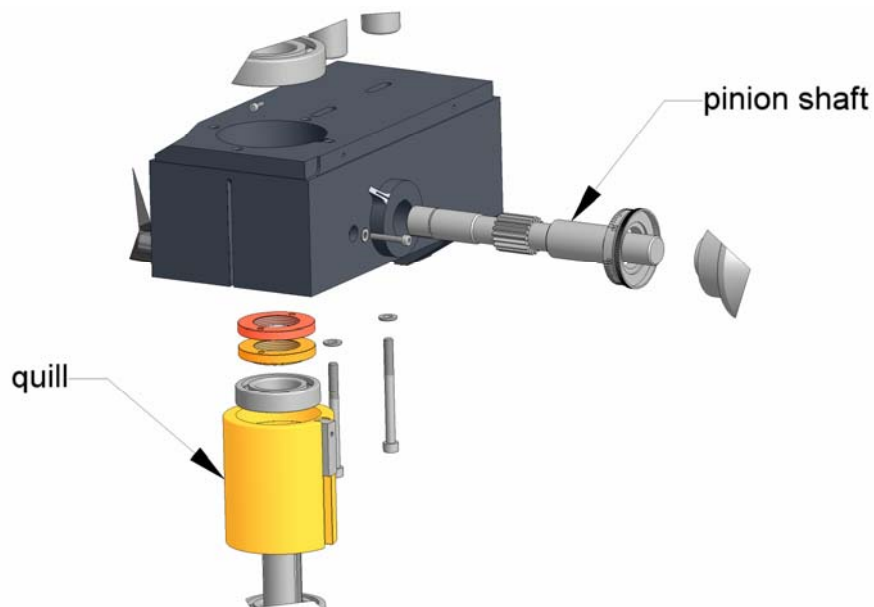
After the machine has been professionally installed and securely mounted it must be connected to the mains supply:

1. A qualified electrician must connect the supply lead of the drilling and milling machine to the local power supply
2. A sufficient supply of lubrication coolant should be on hand in order to run the coolant unit (optional)
3. All functions must be checked

In order to clamp workpieces a clamping screw (suitable for the T-grooves) or a machine vice may be used.

4. Lubrication

The lubrication nipple shown below must be lubricated every 6-8 weeks (compare sketch)



The tailstock and the feed gear pinion must also be greased. To do this, the tailstock must be moved backward and forward, putting some lubricant on the surface of the tailstock and the lateral part of the feed spindle.

It is not necessary to lubricate the drilling spindle, as the ball bearings are fully enclosed and having been lubricated during production, remain so for the entire service life of the machine.

The linear guides are maintenance-free and do not need greasing.

Lubrication means:

- reducing the wear and the friction resistance
- extending the lifetime
- preventing the metal surfaces from corroding

We recommend:

for lubrication:	multi-purpose grease grade 2NLGI
for oiling:	lubrication oil of 100 mm ² /s viscosity

6. Starting-up and maintenance

Spindle nut with trapezoid thread spindle:

The spindle nuts of the milling machines are adjustable.

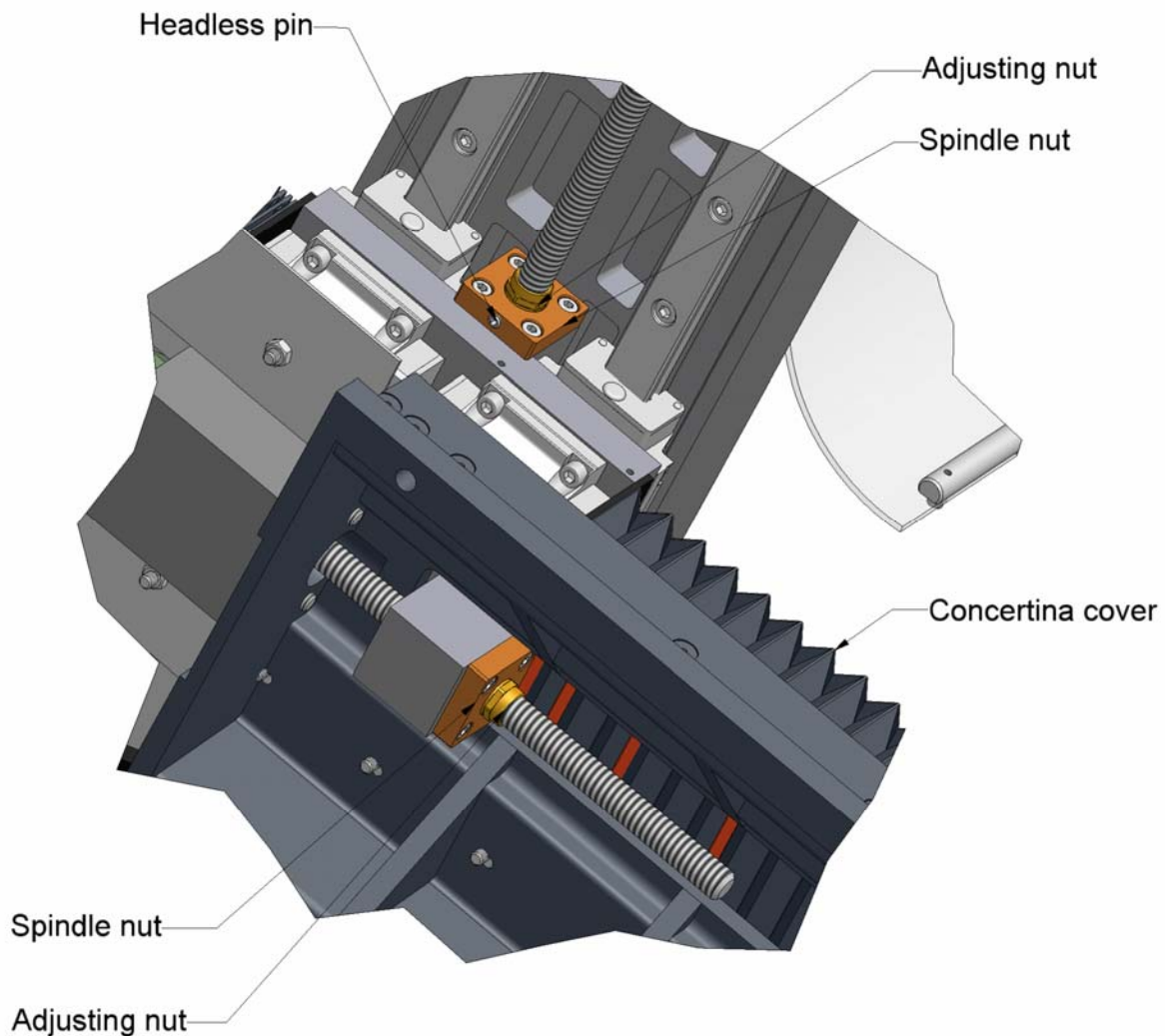
Should at some time a spindle nut of one of the three axes show some play, proceed as follows:

X-axis:

To adjust spindle nuts move the cross table as far as it will go to the right. After loosening the set screw, the adjusting nut is turned a little in the clockwise direction. Turning the adjusting nut like this achieves a mutual tightening of the two nuts and as a result play-free running of the threaded spindle. After the adjustment, the set screw must be re-tightened firmly.

Y-axis:

The readjustment of the Y-axis requires unscrewing the concertina cover of the top slide. The following procedure as per instruction for the X-axis.

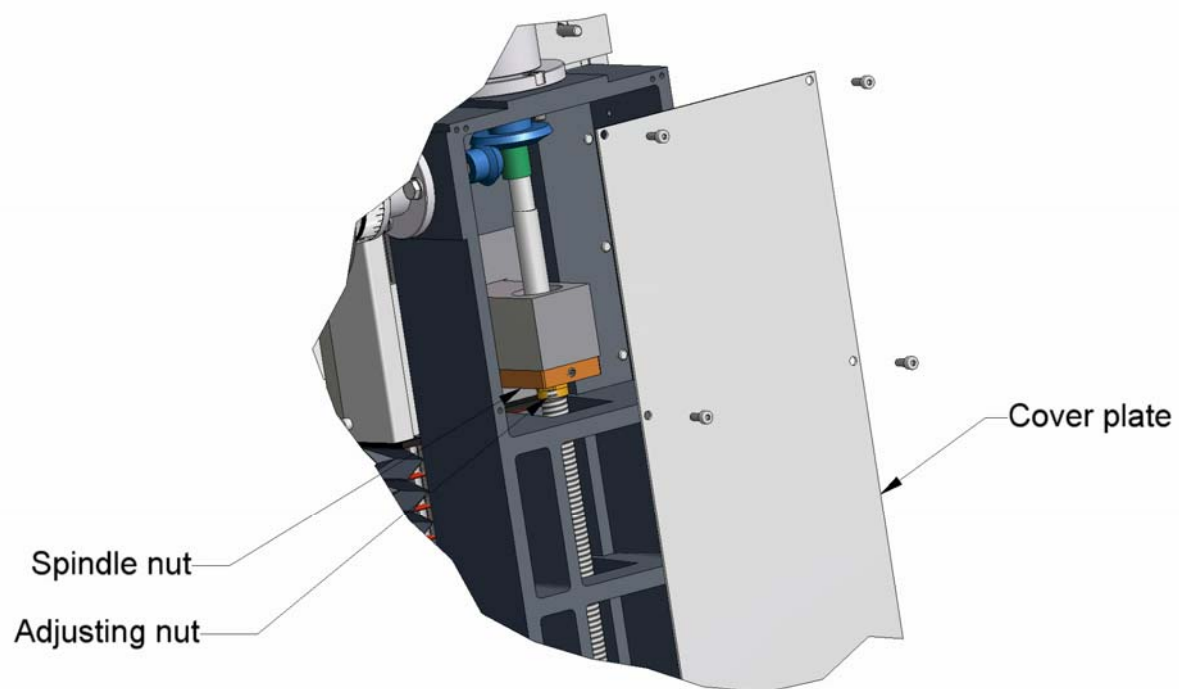


6. Starting-up and maintenance

Z-axis:

To adjust the spindle nuts of the Z-axis, you have to unscrew the cover plate.

The further procedure is as for the X-axis.



Spindle nuts with ball rolling spindle:

An adjustment is not necessary and also not possible.

7. Safety devices and recommendations

In order to make working with our drilling and milling machines safe, we have equipped them with the following safety devices and are thus in accordance with the relevant European safety regulations.

1. **Protective cover**

(Protective partition) attached to the machine housing, prevents reaching in and coming into contact with the work spindle. This safety device is constructed in such a way that it can be adjusted to the necessary working height (depending on the dimensions of the workpiece and tool).

2. **Main switch with low voltage release**

In order to disconnect the electrical parts of the drilling and milling machine safely from the mains, we have provided a main switch with low voltage release besides the mains lead with plug. This under voltage release prevents the drive motor from coming on after a power cut and so excludes the danger of the work spindle moving unexpectedly.

3. **Emergency OFF switch**

This enables a quick curtailment of dangerous movements, in particular when using devices for CNC.

4. **Overload protection**

This device has been developed to protect the drive motor and it must be noted that after the motor has been turned off (by hand or automatically), because of overloading, a short pause of 1-3 seconds must be observed before turning the machine on again so that the relay of the electrical parts can re-establish the closed circuit condition.

5. **Security machine cabin**

The cabin has a door which, when closed, activates a limit switch. The feed motors can only be put into motion on the axis independently by means of the CNC controls, when the door is closed.

When the door is open the motor is switched to idle whereby manual operation is still possible. The main spindle can be switched on whether the door is open or closed.

**It is forbidden to remove the door limit switch or to put it out of action
as this could lead to serious danger to the machine operator and
cause severe accidents.**

7. Safety devices and recommendations

We would like to draw your attention to the following safety recommendations which are a result of a combination of the European standards and our own experience:

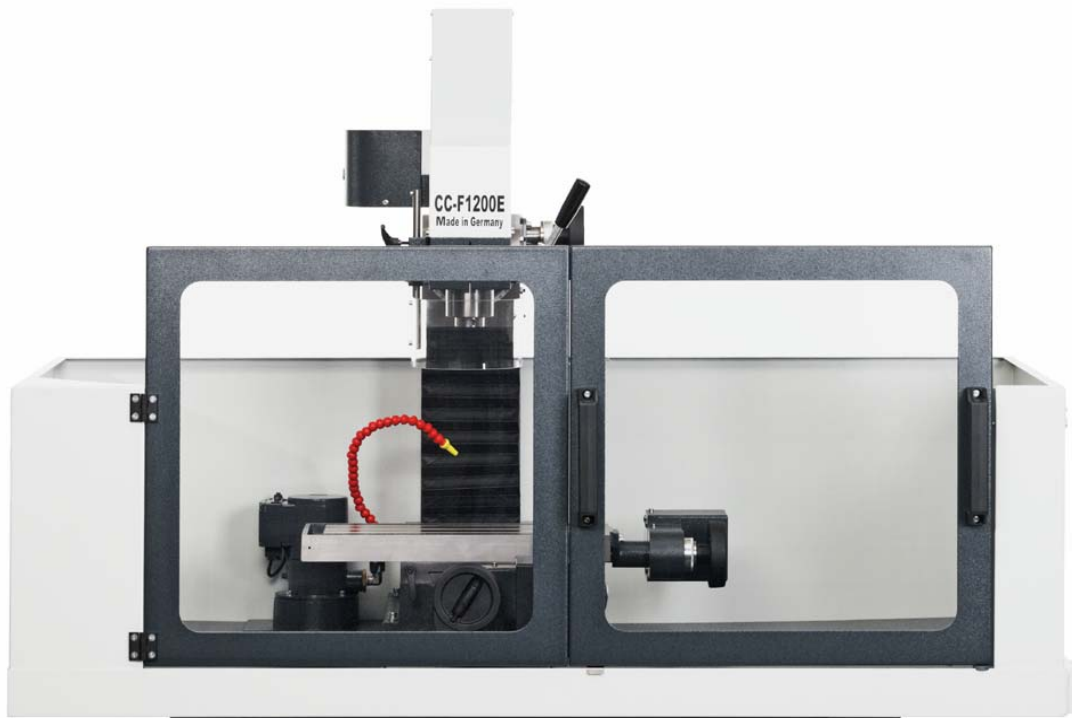
1. Workpieces must be secured in such a way that they cannot be propelled out of position by the torque of the drill or mill.
2. Round workpieces such as corrugated pieces, round lathe work or similar things must be fixed into position by suitable means such as prisms in conjunction with a machine vice when drilling.
3. Machine drills and mills are sharp-edged tools. In order to protect hands, these tools should only be held by the shaft and **not** by the cutting edge when being transported or changed.

The tool cutting edges are sharp and can cause serious injury when touched.

4. Throughout the drilling and milling processes, sharp and often hot swarf is produced which is then thrown off by the momentum of the tool in operation. In order to prevent accidents it is necessary to wear goggles or a face shield.
5. It is further more recommended that well-fitting clothes are to be worn, especially on the arms (nothing loose) and in the case of long hair, a hair net should be worn to prevent anything being caught or drawn in by the rotating work spindle or when changing the workpieces.
6. By pulling the mains plug, the drilling and milling machine is disconnected from the electrical current. This should be observed when doing one of the following: a drill or mill is changed or the machine has to be serviced.
7. In order to avoid wear and tear on the tools and the drive motor, it is recommended that the tools are to be selected with care, worn tools should be exchanged for sharp ones and the feed should be calculated such that the r.p.m. of the work spindle is only slightly reduced. The depth of the feed must be selected with precision so that it is not possible to drill into the support table.
8. We recommend the installation of light which provides a level of at least 500 lux at the point of tool cutting operations.
9. Appropriate means must be used to dispose of drilling and milling swarf.
10. We strongly recommend that the drill chuck key is be fixed to the machine by means of a clamp or similar attachments only. This is in order to avoid the drill chuck key being caught by the tool spindle and being thrown around if it is fixed to the machine with anything flexible like chains or string.
11. When drilling and milling machines are not in use, we recommend installing a safety device to prevent children non authorized people switching the machine on.
12. The drilling and milling machine should be set up where no dampness, apart from the lubrication coolant, can affect it.
13. It is necessary to carry out regular checks for damages to parts and/or for the functions, on drilling and milling machines. Please do not hesitate to call us if you require original spare parts or advice!

7. Safety devices and recommendations

7.1 CC-F1410 LF with safety machine cabin



The CNC-milling machine can be operated manually but also in CNC operation.

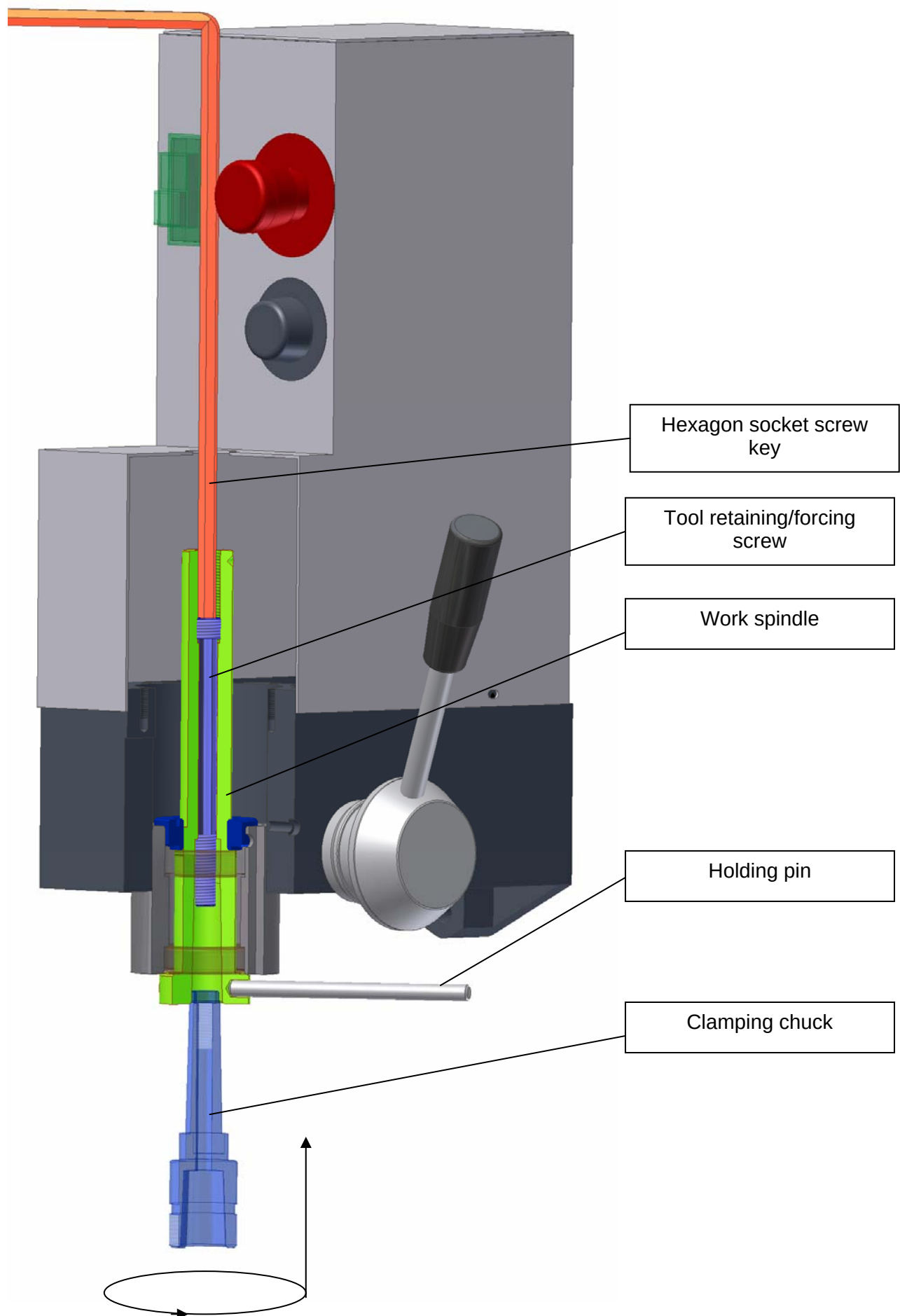
Conventional operation requires the door to be open.

CNC requires the door of the safety machine cabin to be closed. A limit switch which is operated by shutting the door is situated at the right upper side. This is the only way to operate the feed motors at the axes independently via the control.

When changing from manual operation to CNC mode please proceed as follows:

1. close the door of the safety machine cabin
2. turn the stop switch from manual operation to CNC operation
3. select main spindle rotating direction left or right
4. setting of the spindle speed by means of the potentiometer
5. release the stop switch to move the axes
6. start the CNC programme

8. Clamping and ejecting tools



8. Clamping and ejecting tools



This is the core of the WABECO clamp and ejection system, **the tool retaining/forcing screw**. It operates on the principle of the screw having a fine thread located at its head and a coarse thread on the shank. Due to this construction, a special procedure has to be observed when tools with internal threads are to be clamped.

It is not possible to insert a tool or tool holder with internal threads into the work spindle first and then to screw in the tool retaining/forcing screw into the internal thread afterwards! The tool or tool holder must be screwed onto the tool retaining/forcing screw.

As you can see on the picture (page 82), for clarification we have cut open the protective cap and the spindle shell so that the tool retaining screw with the hexagon socket screw key can be seen.

Please proceed as follows:

With the aid of the hexagon socket screw key, screw the tool retaining/forcing screw into the work spindle right up to the end of its thread. Once the screw blocks, turn it back 2-3 revolutions.

Now the tool is inserted by hand from underneath into the taper of the work spindle and screwed onto the tool retaining/forcing screw. While this is being done, the tool retaining screw is held tight by means of the hexagon socket screw key.

Once the tool has been clamped hand-tight, the work spindle is held by means of the holding pin and the tool retaining screw can be tightened with the hexagon socket screw key without any effort.

To eject **tools with an internal thread**, hold the work spindle tight with the holding pin and loosen the tool retaining screw with the hexagon socket screw key.

Now the tool can be screwed off the tool retaining/forcing screw by hand and taken out of the work spindle taper from underneath.

Tools with flat tang (without internal threads) can be clamped by first of all screwing the tool retaining screw as far back with the hexagon socket screw key as is necessary to insert the tool into the work spindle. After doing this, the tool retaining/forcing screw is screwed lightly onto the tool.

To eject the tool, the holding pin is inserted into the work spindle and held tight with one hand. By turning the hexagon socket screw key to the left, the tool is released and can be easily removed from the work spindle.

9. Adjustment of the r.p.m.

A specific cutting speed is needed when milling different materials (e.g. steel, aluminium etc.)

The r.p.m. of the work spindle can be infinitely varied from 140-3000 min^{-1} or 100–7500 min^{-1} on the potentiometer respectively so that the appropriate speed for the material, the workpiece and the diameter of the cutter can be chosen every time.

Please see the table showing the respective r.p.m. values for aluminium and steel as follows:

9.1 Adjustment of the r.p.m. values for working aluminium and steel

ALUMINIUM		STEEL	
tool-Ø	r.p.m. ⁻¹	tool-Ø	r.p.m. ⁻¹
2 mm	3000	2 mm	2000
4 mm	2900	4 mm	1400
6 mm	2850	6 mm	1200
8 mm	2750	8 mm	850
10 mm	2700	10 mm	700
12 mm	2650	12 mm	590
14 mm	2600	14 mm	500

9.2 Adjustment of the r.p.m. for 1,4 kW motor

potentiometer rate %	r.p.m. ⁻¹
1	140
5	140
10	150
15	160
20	200
25	300
30	400
35	700
40	850
45	1000
50	1200
55	1500
60	1900
65	2500
70	2800
80	3000
90	3000
100	3000

9. Adjustment of the r.p.m.

9.2 Adjustment of the r.p.m. for **2,0 kW motor** (high speed)

potentiometer rate %	r.p.m. ⁻¹
2	50
3	100
4	200
5	350
10	700
15	1000
20	1400
25	1700
30	2100
35	2500
40	2900
45	3200
50	3600
55	4050
60	4500
65	4800
70	5200
75	5600
80	6050
85	6500
90	6900
95	7200
100	7500

10. Feed motion

10.1 Feed motion X,Y and Z-axis

The traverse and longitudinal motion of the cross support (X,Y-axis) is accomplished by turning the handwheels (parts-no. 4 and 12). Both slides can be blocked with the aid of clamping levers (parts-no. 21 and 3).

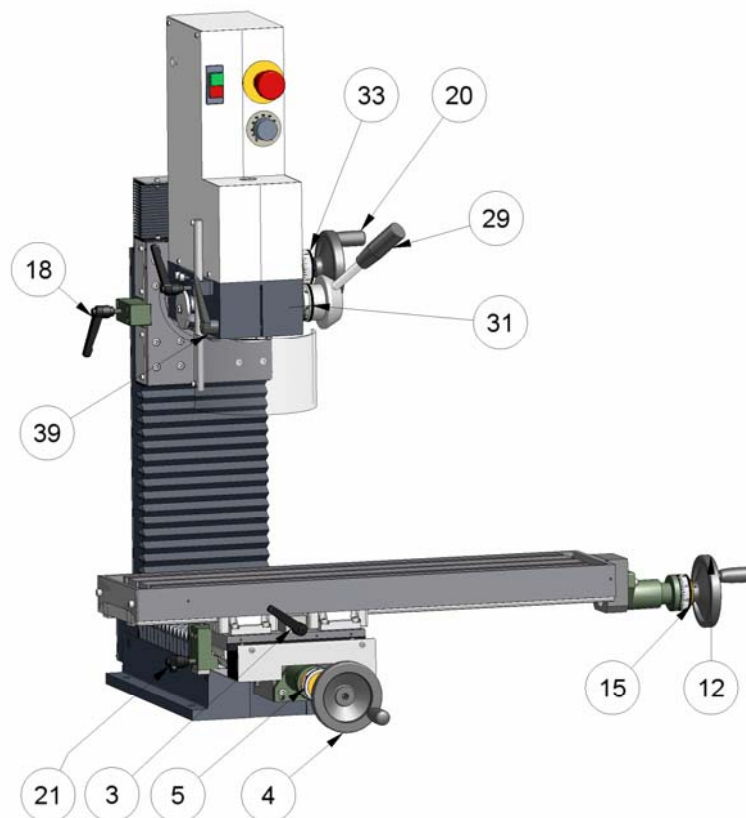
The feed motion – drilling and milling depth (Z-axis) – is accomplished by using the handwheel (part-no. 20).

To operate the milling head by means of the handwheel, loosen clamp lever (part-no. 18) and fix it again after operation.

Graduated collars have been installed to enable the feed path to be read off (parts-no. 5, 15 and 33). One full rotation of the handwheel corresponds to 4 mm of the slide path and with ball rolling spindle 5 mm, one graduation on the collar corresponds to 0,05 mm on the path.

Feed path of the axes:

- longitudinal	X-axis	500 mm
- transverse	Y-axis	200 mm
- vertical	Z-axis	280 mm



Another possibility of operating the tool spindle is by turning the control lever (part-no. 29). After loosening the clamping lever (part-no. 39) the control lever can be turned. One graduation on the collar (part-no. 31) corresponds to 1 mm of travel.

The work spindle has a maximum travel of 55 mm. The clamping lever must be well tightened up again afterwards.

We recommend that the travel (engagement) should not be selected too generously, but that in the case of greater engagement depth this should be accomplished in multiple steps.

11. Recommendations for application and operation

We recommend the following:

- the drill should be inserted and clamped with the chuck key in such a way that the drill is positioned exactly between the three clamping jaws of the toothed ring chuck, the quick action chuck or the drawing-in attachment of the drill
- mills with a shaft should be clamped by means of a precision draw-in attachment with morse taper MT2 and tightening thread M10 and the appropriate precision clamping collet in accordance with DIN (German Industrial Standard)
- mills with a bore hole (all those with a Ø of 16 mm) and a longitudinal groove should be clamped by means of precision shell end mill with mill retaining screw and feather key, MT2x16, draw-in tightening thread M10

It is important to observe the following when drilling:

- the appropriate r.p.m. must be set according to the diameter of the drill
- the contact pressure should be such that the drill can still cut with ease
- when the contact pressure is too high it will result in premature wear on the drills, even the possible snapping of drills or them sticking fast in the bore hole

If a drill sticks fast, switch the motor off immediately, use the emergency OFF switch.

- when processing hard materials, i.e. steel, normal commercial drilling oil must be used
- the spindle must always rotate when the drill is removed from the workpiece
- when processing non-metallic materials, i.e. wood and when having to drill right through, splintering can be prevented by clamping a piece of waste wood under the material to be processed
- when processing veneered or plastic-coated workpieces of wood, always drill from the good side
- when processing thin metal sheeting, a piece of waste wood should always be clamped underneath

It is important to observe the following when milling:

- choose the appropriate cutting speed:

for materials with normal mechanical strength properties, e.g. steel	18-22m/min
for materials with higher mechanical strength properties	10-14m/min

(see also paragraph 9 - r.p.m. adjustment)
- regulate the contact pressure so that the cutting speed remains constant
- when processing hard materials use normal commercial drilling oil

It is important to observe the following when clamping the workpieces:

- use suitable straining screws or machine vices for the T-slots of the milling machine table
- always remove waste material and swarf from the milling machine table of the cross support in order to clamp level and accurately

11. Recommendations for application and operation

11.1 Swivelling of the milling head

In order to produce bore holes and chamfering at an angle which diverges from the normal vertical position of the milling head, the milling head can be swivelled up to 90° either to the right or to the left.

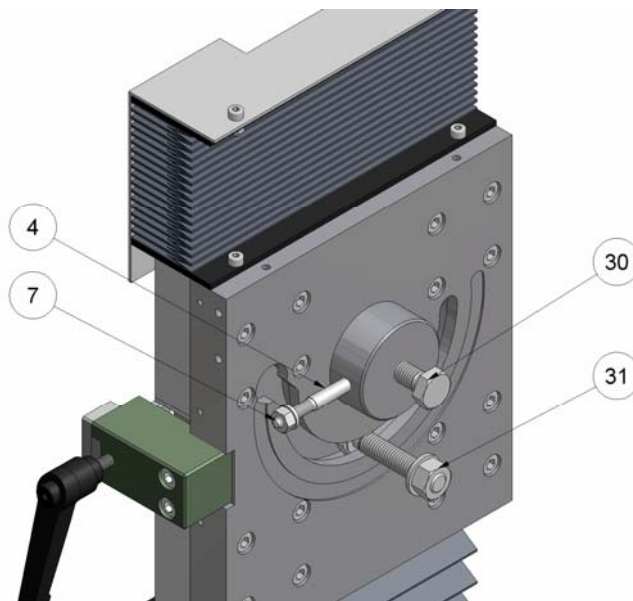
If an adjustment is intended please proceed as follows:

After loosening (turn to the left) the lock nut (part-no. 7) turn the hexagon nut as far to the right against the housing of the tool spindle until the index pin (part-no. 4) can be pulled out by hand.

Loosen both the high nut (part-no. 30) and the hexagon nut (part-no. 31) on the vertical slide by then turning to the left.

Now the milling head can be swivelled to the desired degree to the left or to the right. In order to fix the milling head in this position, tighten both the high nut and the hexagon nut again.

In order to bring the milling head back to its normal position, loosen the high nut and the hexagon nut on the vertical slide and bring the vertical slide back to its upright position. After turning back the hexagon nut on the index pin, the latter can be pushed into the opening in the work spindle housing by hand. Now, both the hexagon nut and the lock nut of the index pin as well as the hexagon nut and the high nut on the vertical slide can all be tightened.



12. Unit for lubrication coolant

The unit for lubrication coolant consists of:

1. Tray with lubrication coolant sump which collects the lubrication coolant mixture for the feed pump.
Content: Coolant unit Order No. 11264 13 litres
 Safety machine cabin Order No. 1640090 42 litres

2. Feed pump with the following electrical data:

- nominal voltage 230 V
- frequency 50/60 Hz
- nominal current input 0,4A
- nominal output 0,07 kW
- ON-OFF switch and mains lead with a length of 2 m complete with earthed plug

3. Adjustable, flexible pressure tubing with stop valve and nozzle: for transporting the lubrication coolant to the processing point.

An increasing number of customers wish to include this fixture in their order so as to take advantage of “wet processing” for the production of their goods/workpieces and to:

- to cool and lubricate, in particular during lengthy processing
- when processing high alloy steel and aluminium
- extends working life of tool
- to improve the surface finish and accuracy of the workpieces
- to reduce friction heat
- to prevent built-up edges

When using lubrication coolants, especially water based emulsions, a number of health and safety measures must be observed:

1. use concentrated products free of nitrates
 2. use concentrates without secondary amines
 3. use products with the lowest possible allergy potential
4. When mixing a refill of lubrication coolant, please observe the following:
 - clean/rinse the circulation system (tray/filter)
 - determine the concentration necessary to meet the technical demands (concentrate: water 1:5 – 1:30)
 - check the water has a low level of nitrates (< 50 mg NO₃⁻, test strip)
 5. A cleaning plan should determine at what intervals the system should be cleaned of swarf and other waste.
 6. A service plan should determine the following:
 - when to check the concentration in use (daily/weekly)
 - when to check the pH values (weekly)
 - when to check/assess the bacteria count (monthly)
 - when to check the nitrate content (weekly)(The information in brackets can be varied according to the production circumstances)
 7. In order to reduce splashing, we recommend the attachment of a splash guard and/or reducing amount sprayed from the nozzle.
 8. Since steps to protect the skin must be taken, it is advisable to wear gloves and aprons. The skin should be cleaned with acidic syndets without abrasive ingredients and rich cream should be applied to regenerate the skin.
 9. Please also adhere to the enclosed information on the general operating instructions.

13. Declaration of noise levels in accordance with DIN EN 24871 (German Industrial Standard)

Noise levels while running idle

Acoustic capacity level	78 dB (A)
Sound pressure level on operator's ear	62 dB (A)

The stated values reflect emission levels and not necessarily working levels. Although there is a correlation between the level of emission and the level of stress, this cannot be used reliably in order to determine whether additional safety measures are necessary or not.

Other factors which influence the actual stress level of employees are the characteristics of the working area, other sources of noise, i.e. the number of machines and other processes going on nearby etc. Apart from that, the permitted stress levels may vary from country to country.

This information enables the user of the machine to assess the dangers and risks more accurately. However, in order to state a reference value of noise levels which could manifest itself to the ears of the operator during processing, the following measurement conditions are given:

Shell end mill 10 mm, cutting depth 3 mm

Spindle r.p.m. 2240 1/min, feed 0,09 mm/revolution, AlCuMgPb-cuboid workpiece

The adjusted sound pressure level is 91 dB (A).

14. Disposal of the drilling and milling machine

The transport and protective packaging is made by means of the following materials:

- corrugated cardboard
- polystyrene free of freon
- polyethelene foil
- non-returnable wooded pallet (untreated)
- Euro pallet (deposit)

If you have no further need of these articles or do not wish to use them again, please dispose of them at the public recycling facilities.

The drilling and milling machine consists of up to 98% of recyclable materials, i.e. steel, cast iron, aluminium and 2% of chemical materials, e.g. the coating of electrical leads, printed circuits.

If you have trouble disposing of these parts in a proper manner, we would be pleased to help you: upon mutual agreement we will take the complete machine back and dispose of it.

However, the costs for transporting the machine to our plant must be at your expense.